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MAURITIUS

Annual Report

OF THE

Ministry of Agriculture

AND

Natural Resources and the Environment

for the year 1980

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MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
AND THE ENVIRONMENT

Agricultural Services,
Reduit,
16th June, 1981.

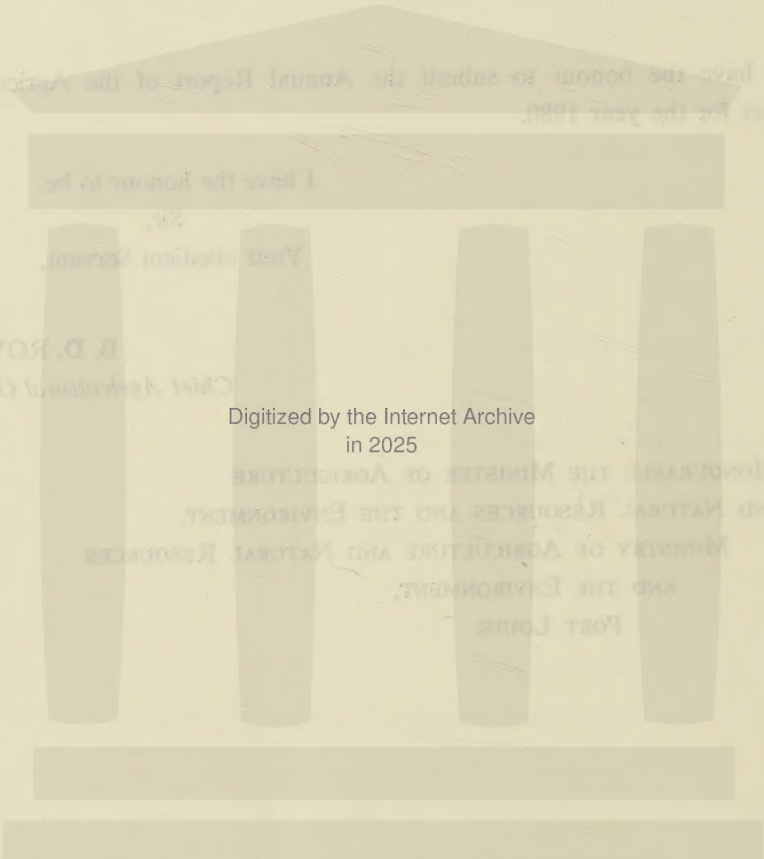
SIR,

I have the honour to submit the Annual Report of the Agricultural Services for the year 1980.

I have the honour to be,
Sir,
Your obedient Servant,

B. D. ROY
Chief Agricultural Officer.

THE HONOURABLE THE MINISTER OF AGRICULTURE
AND NATURAL RESOURCES AND THE ENVIRONMENT,
MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
AND THE ENVIRONMENT,
PORT LOUIS.



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Annual Report of the Ministry of Agriculture and Natural Resources (Agricultural Services) for the year 1980

I. Introduction

1.1 In virtue of the powers conferred upon the Minister by sub-section (i) of section 3 of the Ministry of Agriculture and Natural Resources (Integration) Ordinance, 1963, as subsequently amended, the powers and duties exercisable under any law in force by the Chief Agricultural Officer have been transferred to the Permanent Secretary under the Ministry of Agriculture and Natural Resources (Transfer of Power and Duties) Order 1972 made on the 31st January 1972 and which came into force on the 5th of February 1972.

1.2 The Chief Agricultural Officer advises the Permanent Secretary on matters referred to him—policy, administrative and technical. He is responsible for the planning, coordination and execution of the work of the different divisions of the technical services of the Ministry, which, except for the Forestry Service, are grouped in the Agricultural Services. He is assisted by three Principal Agricultural Officers. Principal Agricultural Officer, Dr. S. Moutia, was responsible for the coordination and implementation of the approved programme of work of divisions involved with crop production, viz. the Divisions of Agronomy, Horticulture, Plant Pathology, Entomology and Agricultural Chemistry up to mid-August, after which he was replaced by Mr. R. Brunet; Principal Agricultural Officer, Mr. M. Narain, was responsible for the coordination and implementation of the programme of work of Divisions, involved in livestock research, viz. Animal Production Division, Division of Veterinary Services, Dairy Chemistry Division; he was also responsible for the Agricultural Division in Rodrigues; and Principal Agricultural Office, Mr. K. Lutchmeenaraidoo, was responsible for the coordination and implementation of the programme of work of the Extension Services Division, Land Use, Environment and Projects Division, Agricultural Engineering Division and Field Services Division. The Cane Planters and Millers Arbitration and Control Board remained under the responsibility of the Chief Agricultural Officer.

1.3 The Chief Agricultural Officer and the Principal Agricultural Officers also serve on a number of Boards and Committees either as chairman or as members. These Boards and Committees are listed at Chapter II. They fall under the responsibility of the Ministry of Agriculture and Natural Resources and the Environment. They submit their own Annual Reports. This report deals with the work carried out by the professional, scientific and technical officers in the Agricultural Services.

1.4 In the course of the year some further changes have taken place in the organisation of the Agricultural Services. It has been found desirable to entrust the control of management of the experiment stations of both crops and livestock to the Divisional Scientific Officers responsible for the relevant research programme. A new Division, called the Division of Horticulture, was created and the Divisional Scientific Officer (Horticulture) was entrusted with the responsibility of controlling those stations dealing mainly with seed production, plant propagation and research on horticultural crops. The Agricultural Superintendents reesponsible for the management of the experiment stations, now three in number—viz. (i) Agricultuarl Superintendent responsible for Livestock Breeding Stations; (ii) Agricultural Superintendent responsible for Crop Experiment Stations and Agricultural Superintendent responsible for Seed Production and Plant Propagation are now responsible to the relevant Divisional Scientific Officers.

1.5 In January, 1980, Cyclone Hyacinthe, which followed closely on Cyclone Claudette, brought excessive rain thus causing the extensive flooding of cane fields. Then, came cyclone Jacinthe and depression Kolia in February, and again cyclone Laure in March. These cyclones caused considerable damage to vegetables and foodcrops and to sugarcane, tea and tobacco.

1.6 Experiments on rice at Belle Vue Farm continued. The use of weedicides as compared to hand weeding showed promising results. Two weedicides—Preforan and Chemrice—seemed to be almost as good as hand weeding. The station also produced paddy and five tons of seeds were sent to Barkly Experiment Station for storage. All other paddy rice is disposed of through the Ministry of Supplies, after processing at the Rice Mill at the Livestock Feed Factory.

1.7 Trials on the production of fodder crops continued. Acacia varieties-Peru, Guatemala and Cunningham were tried to ascertain optimum spacings and cutting heights. The use of sweet potato as an alternative source of fodder was investigated; further experimentation is being carried out on the variety Chain which has given promising results.

1.8 The construction of a new building for the seed processing complex at Barkly Experiment Station was started. On completion, this building will house seed processing equipment which have been received from the Food and Agriculture Organisation under the project "Strengthening of and Training in vegetable Seed Production". When the complex becomes functional, a marked improvement in seed quality and quantity produced for sale to the public can be expected.

1.9 Experimentation with high yielding onion varieties was continued in 1980. Twelve new varieties were included in trials to assess yields and to establish the time of planting. Yields of up to 62.5 tons/ha were obtained. Samples of all varieties were sent to the Agricultural Marketing Board for storage under low temperature conditions. The objective of the storage is to find out the possibility of and varietal difference in storage of the difference varieties for periods of about six months from harvest, when there is a shortage of onion on the market.

1.10. The maintenance and improvement of agricultural productivity through the prevention and control of plant diseases remains the fundamental activity of the Plant Pathology Division. During the year under review the main aspects of research were on the following:—*(a)* the exploitation of disease resistance in tobacco, crucifers, tomato, eggplant; *(b)* field inspection of seed crops and health testing of seeds on sale to the public; *(c)* chemical control experiments on diseases of tomato, tobacco, onion and garlic; *(d)* proper identification of bacterial and virus diseases of chilly, tobacco, leguminous and cruciferous crops.

1.11. For the first time in the entomological history of the island, an attempt at eradication of an insect pest by the sterile insect technique was made. The insect is he Natal Fruit-Fly *Pterandrus rosa,* which is a severe pest of cultivated and wild fruits. (The decision to attempt eradication was taken after the series of cyclones which hit the island during the summer of 1979-80. The strong winds, which blew during the December 1979 cyclone, destroyed all the fruits and this destruction brought about a dramatic decrease in the natural population of the fruit-fly which reached such a low level that sterile insects could bring about eradication. The release of sterile flies started in August and evaluation of results will be made in the 1981-82 summer. During the campaign, 5-10 million flies are being released monthly, releases being made every 2 days.

1.12 Following the recommendations of Harrisons Fleming Advisory Services, the Consultants for the project on foliar diagnosis in tea, the Agriculture Chemistry Division joined the " Wageningen Circuit " in January 1980 in order to have a control procedure for the accuracy of the analysis of tea leaves. This circuit consists of many participating laboratories throughout the world. Every two months, each laboratory receives six plant samples from Wageningen for the determination of various elements. The results obtained are then sent back for compilation.

1.13. Under British Technical Assistance, the Agricultural Chemistry Division received the visit of Mr. R. M. Baker, Agricultural Chemist from Tropical Soils Analysis Unit, Reading, in February-March 1980. He spent four weeks commissioning the Soil and Plant Laboratory, dealing mainly with analytical methodology.

1.14. New gas liquid chromatographic methods for the determination of pesticide residues in crops were studied. It was observed that various pesticide residues in crops from different Experiment Stations were below the maximum residue limits, recommended by joint FAO/WHO Codex Alimentarius Commission.

1.15. Applied nutritional research in livestock, utilizing local products and by-products, was one of the main activities of the Animal Production Division in collaboration with Dr. T. R. Preston, Consultant in Tropical Animal Production to the Ministry and to the project " Milk Production and Processing ". Research on the use of high protein forages such as acacia

(Leucaena leucocephala), in the diet of beef and milch cattle continued and in this context about 15 arpents of land each at Palmar and Richelieu Livestock Breeding Stations were planted with acacia. Other agro-industrial by-products such as poultry litter also received due attention in animal feedling.

1.16. As from August, the Animal Production Division was made responsible for the control of the management of the Livestock Breeding Stations.

1.17. The Ruminant Research Laboratory at Richelieu Livesock Breedding Station was fully operational during the year and it helped to understand more clearly the utilization of feeds by the ruminant animal. Several *in-vivo* digestibility studies were undertaken with various forages, utilizing fistulated bulls and these yielded valuable information on the forage.

1.18 The adverse climatic conditions early during the year caused a lot of stress to animals throughout the Island and production was very much affected. Quite a number of animals on the stations lost their good condition as feeding could not be done properly. It took several months to bring the animals back to good condition and consequently to normal production.

1.19. Performance testing of cross-bred animals continued at Richelieu and it was found that the Sahiwal X Friesian bull was comparable with the Simmental X Friesian bull. The cross-bred heifers started coming in production during the year. Natural mating, as opposed to artificial insemination, considerably decreased the calving interval on the stations. The majority of the animals now have a calving interval of between 13-14 months.

1.20. On matters relating to the environment, several site investigations were effected following pollution complaints. A survey of the environment pollution problems on Sugar Estates was carried out and recommendations made. An investigation of the pollution of St. Louis River, caused by industrial activities, was carried out with the view to up-date environmental legislation.

1.21. The Chief Agricultural Officer and the Principal Agricultural Officer responsible for crop production, Dr. S. Moutia, visited Rodrigues towards the middle of July. The object of the visit was to inspect and review the development programme of past years and of the current year. As had been pointed out in earlier years, the Agricultural Division in Rodrigues is responsible for practically all development work, including development of non-agricultural works, e.g., the construction of a retaining wall at Camp du Roi at Port Mathurin to hold sand removed by dredging to improve access of ships to the quay. The development objectives and agricultural works to implement the objectives remain the same as had been stated in a previous annual report. They are re-stated hereunder.

1.22. The development objectives are:

(i) To provide and, in certain cases, to improve the water supply to farmers of the valley and in most cases of other valleys as well, including Port Mathurin, to meet domestic, livestock and irrigation needs;

(ii) To improve water catchment and stream flow in the valley;

(iii) To stabilise the slopes of the valley in as permanent a manner as is reasonably feasible;

(iv) To achieve a quick increase in agricultural production;

(v) To demonstrate rational and efficient land use.

1.23. To achieve these objectives the development works in progress are:—

(i) Reafforestation of the steeper and upper slopes to protect the soil and ensure a stream flow in the valley;

(ii) Building of stone walls around reafforested areas for protectection against grazing by stray animals until the plants are well established;

(iii) Building small walls across the gullies to control erosion and water flow;

(iv) Terracing the steeper slopes for croping with minimum erosion risks;

(v) Resettling of lessees from erosion susceptible slopes to lower slopes;

(vi) Establishing and maintaining pastures on lands not otherwise suitable for crop production;

(vii) Building dams to impound water;

(viii) Building offstream reservoirs to avoid destruction by floods;

(ix) Building storage reservoirs on the crests of hills for distribution by gravity to the valleys around;

(x) Installation of pumps for pumping water from dams in the valleys to storage reservoirs on the hills;

(xi) Installation of pipes for water reticulation to farmers around;

(xii) Establishing demonstration gardens for vegetable production and for showing cultural practices.

1.24. Dr. G. M. Lallmahomed, Divisional Scientific Officer, Plant Pathology, accompanied by Dr. J. C. Autrey, Senior Scientific Officer, Plant Pathology of the Mauritius Sugar Industry Research Institute visited Rodrigues in late September to assess the phytosanitary situation in the island with special relevance to the cultivated crops. The winter crop of maize was found to be infected seriously by the maize streak, a virus disease. *Helminthosporium* leaf spot, a fungal disease, was encountered sporadically in the elevated areas. The main problems on onions and garlics were thrip damage *(Thrips Tabaci)* and pink root rot *(Pyrenochaeta Terrestris).* They were

quite common on all onion and garlic plantations. On tomato, fruit-fly damage caused by *Pardalaspis cyanescens* and *stemphylium* leaf spot were imported problems.

1.25. With the appointment of the former Principal Agricultural Officer in charge of crop production, Dr. S. Moutia, as Resident Commissioner in Rodrigues towards the middle of the year, much improvement is expected as regards agricultural development and the necessary infrastructure, including staffing, housing and working conditions.

II. Boards and Committees

The Permanent Secretary or his representative served on the following Boards and Committees:

Agalega Corporation Board
Agricultural Marketing Board
Board of Agriculture, Natural Resources and the Environment
Board of Examiners for the Registration of Agricultural Chemists
Cane Planters and Millers Arbitration and Control Board
Cane Release Committee
Fisheries Advisory Board
Institute of Education Council
Irrigation Committee
Land Settlement Committee
Mauritius Meat Authority
Mauritius Sugar Industry Research Institute Executive Board
Mauritius Sugar Industry Research Institute Advisory Board
Pesticides Control Board
Rose Belle Sugar Estate Board
Sugar Industry Development Fund Committee
Sugar Insurance Fund Committee
Sugar Millers Development Fund Committee
Sugar Planters Development Fund Committee
Sugar Planters Mechanical Pool Corporation Board
Tea Board
Tea Development Authority
Tobacco Board
University of Mauritius, Senate
University of Mauritius, Council

III. Board of Agriculture, Natural Resources and the Environment

3.1 The Board functions under Act No. 2 of 1977. It advises the Minister on all matters of general policy relating to agriculture, forestry and the utilisation and preservation of natural resources and the environment.

3.2 The following advisory committees were set up for specific purposes, and function under the aegis of the Board:—

(a) The Land Settlement Committee

(b) The Cane Release Committee

(c) The Man and Biosphere Advisory Committee.

3.3 The Board met in April. Recommendations were made for the composition of the sub-committees of the Board: Cane Release Committee, the Land Settlement Committee and the Man and Biosphere Committee and to approve the recommendations made by the Cane Release Committee.

3.4 There was no meeting of the Cane Release Committee during the year 1980.

3.5 The Land Settlement Committee met in December 1980 and approved 28 cases of transfer.

3.6 The Man and Biosphere Advisory Committee which has been set up to advise the Ministry on matters relating to the environment met seven times during the year. Amongst others, the Committee discussed problems such as the protection of marine turtles, the indiscriminate dumping of rubbish along road sides and the pollution of waterways by industrial activities.

IV. Comité de Collaboration Agricole Maurice—Reunion—Madagascar—Comores

4.1 The twenty-eighth conference of the Comité de Collaboration Agricole Maurice-Réunion-Madagascar-Comores was held in Réunion from the 3rd to the 8th November 1980. Representatives from Réunion, Mauritius and the Comores attended the meeting. It was proposed and agreed that the former Director of the Mauritius Sugar Industry Research Institute, Mr. Robert Antoine, be made honorary member of the Committee for the effective role he had always played in the deliberations of the Committee. Field visits in Réunion included: I.R.F.A. of Carreau Alfred for temperate foodchops, artificial rearing of tortoise at St. Leu, oil refinery at PROMAG, commercial rose plantation at Tampon, the cheese making factory of CILAM, a feedlot at Ste. Marie. The programme of field visits between scientists in Réunion, Mauritius, and the Comores from one country to another was established for the following year.

4.2. The Chairman of the local committee is the Director of the Mauritius Sugar Industry Research Institute; the Ministry of Agriculture and Natural Resources and the Environment is represented on the Committee by the Chief Agricultural Officer.

V. The Sugar Industry

Crop Results

5.1. Deficient rainfall in November retarded the growth of the cane, especially in the West, where cane length was much below the average normally expected in December.

In the middle of December, 1979 heavy thundery showers helped cane growth to some extent. Shortly after, cyclone 'Claudette' hit Mauritius directly in December and impaired the growth of the canes although high rainfall was recorded. Considerable damage was done to the standing crop; however, no extensive breakage of the canes was observed, as they were relatively short at that time.

In January, 1980, cyclone 'Hyacinthe' which stayed in the vicinity of Mauritius for about 12 days, brought a heavy amount of rainfall, causing extensive flooding of the cane fields. This was followed by cyclones 'Jacinthe' and 'Laure' and by depression 'Kolia'. These abnormal climatic conditions coupled with excessive rainfall and lack of sunshine during the months of January to April were responsible for lower sugar extraction.

The total output of sugar amounted to 477,051 metric tons at 98.5° Pol.

5.2. Hereunder are some of the crop results compared with those of 1979:

	1979	*1980*
Area cultivated (arpents) (total)	204,153	202,660
Area reaped (arpents) (total)	188,884	187,508
Area reaped (arpents) (estates)	106,694	106,391
Area reaped (arpents) (planters)	82,190	81,117
Cane produced (metric tons)	6,313,084	4,564,355
Sugar produced (metric tons) 98.5° Pol ...	690,541	477,039
Commercial sugar 98.8° Pol	688,383	475,590
Tons of cane per arpent (metric) ...	33.4	24.3
Tons of sugar par arpent (metric) 98.8° Pol ...	3.64	2.54
Yield of sugar per cent cane	10.90	10.42
Crushing rate, hourly, metric tons ...	110.7	107.9
Crushing rate, daily, metric tons	2,208	2,090

Cane Varieties

5.3. In order of importance, the main varieties making up the 1980 crop were the following on estate land:

			%
M 13/56	...	...	27.62
S 17	...	...	22.73
M 377/56	...	...	17.73
M 93/48	...	...	9.19
M 31/45	...	...	3.09
B 51129	...	...	2.64
M 124/59	...	...	2.31
M 356/53	...	...	2.23
M 574/62	...	...	2.09
Triton	...	...	1.98
M 555/60	...	...	1.62
M 438/59	...	...	1.21
M 376/64	...	...	0.81
M 1227/62	...	...	0.62
M 2173/63	...	...	0.55
M 94/63	...	...	0.14
N Co 376	...	...	0.12
Other varieties	...	...	3.31

Quotas and Prices

5.4. Only 442,276 metric tons of sugar were exported during the period 1980-81 against the quota under the Common Market Agreement owing to the deficient crop which resulted from bad climatic conditions.

The price offered under the Common Market Agreement was £ 222.05 per tonne ± the Monetary Compensatory amount.

Exports

5.5. The exports of sugar were as follows:—

Destination	*1979*	*Long Tons 1980*
United Kingdom	430,317	548,419
Canada	13,750	—
U.S.A.	118,118	14,022
France	39,900	54,363
Fed. Republic of Germany ...	1,020	—
Sri Lanka	30	—
Comoro Islands	1,200	—
Netherlands	—	504
TOTAL ...	604,335	617,308

Apart from the sugar exported, there were 36,657 tons consumed locally.

Molasses and Alcohol

5.6 The production of molasses for the crop amounted to 136,837 metric tons and the quantity exported during the calendar year was 154,254 metric tons. As in previous years, molasses were used for the manufacture of rum and various alcoholic products; 160 tons of molasses were used for production of cowfeed. Medine Sugar Estate produced some 956,706 litres of alcohol at 100° G.L. and 169,996 litres of vinegar; Solitude produced 701,807 litres of alcohol and 37,780 litres of perfume at 100° G.L. and St. Antoine 948,150 litres of alcohol at 100° G.L.

VI. The Cane Planters and Millers Arbitration & Control Board

Head of Division: A. A. Aumeerally, General Manager

6.1 The Board operated under " The Cane Planters and Millers Arbitration and Control Board Act No. 46 of 1973 and No. 26 of 1976 ". The executive machinery of the Board was run as a division of the Ministry of Agriculture and Natural Resources and the Environment.

Meetings of the Board

6.2. The Board held 17 meetings during the year as follows:—

5 meetings in connection with assessment of Sugar to planters for the 1979 crop

4 meetings in connection with assessment of sugar to planters for the 1980 crop

5 meetings in connection with protests against assessment of sugar for the 1979 crop

2 meetings in connection with closing of cart weighbridge at Beau Plan Sugar Estate and Bassin Weighbridge No. 1 at Medine Sugar Estate

5 meetings in connection with applications for separate sucrose content tests

During these meetings the following matters were also discussed: Final road rate for 1979 crop, separate tests for mechanically and manually loaded canes, grievances of the Mauritius Planters Association, hours of work at the Board's laboratories, weighing of special sugars at the Docks, posting of technical staff ofthe Board during intercrop, training of staff at the University.

6.2.1. The reports of the Committee, set up to look into the question of planters' share of excess bagasse, was examined by the Board. Another committee was therefore set up by the Ministry on the recommendations of the Board to determine whether or not any apportionment of the proceeds of sale of electricity should be made between millers and planters.

Cane Testing

6.3. The canes supplied by 792 planters or group of planters, were tested separately. The total number of tests carried out was 189,866 by use of core sampling equipment.

Assessment of Sugar

6.4. Following the publication of the final assessment of sugar for the 1979 crop, 6 Cooperative Credit Societies and 3 planters lodged protests against the assessment, made by the Board. However, the protests of one of the Cooperative Credit Societies reached the office of the Board after the expiry date for appeal and was rejected. Three Cooperative Credit Societies and two planters withdrew their protests after all the necessary information was given to them by the Board. The cases of the other two remaining Cooperative Credit Societies and that of the planter were heard by the Board and their protests were rejected.

Transport Costs

6.5 The final assessment of Road Rate for the 1979 crop, approved by the Board, was as follows:—

(i) Millers were entitled to claim Rs 4.65 for the first ton mile and .73 cents for each additional ton mile in respect of canes transported from outlying weighbridges to factories. The maximum mileage claimable was 4 miles.

(ii) Planters who had themselves caused their canes to be delivered to factories were entitled to a refund of 73 cents per ton mile for each mile over and above a distance of 4 miles.

Delimitation of Factory Areas

6.6 Only one application for change of factory area from St. Antoine to Mon Loisir was received by the Board and the application was granted.

Middlemen's Permits

6.7 Twenty permits to act as middleman were issued.

Cane Contracts

6.8 There were *9,225 cane* contracts registered by the Board, covering some *31,116* planters. The number of planters, who failed to enter into contract before the 31st May, totalled 743 compared with 628 in 1979.

Cane Varieties

6.9. During 1980, the varities approved for planting were as follows:

M 134/32 (red, white and striped)	M. 377/56
M 31/45	M. 555/60
M 202/46	M. 574/62
M 93/48	M. 1227/62
	M. 94/63
M 99/48	M. 2173/63
M 253/48	M. 376/64
M 442/51	Ebène 1/37
M 409/51	Ebène 50/47
M 13/53	B 37172
M 356/53	B 37161
M 13/56	B 51129
M 351/57	N Co. 376
M 124/59	S. 17
M 438/59	Triton

Control of Weighbridges

6.10. The number of weighbridges in operation was 72. All the weighbridges were tested for accuracy, prior to the beginning of the crop. 64 were found correct on first examination, 4 on second examination, 3 on third examination and 1 on fifth examination. All the weighbridges were again tested on 9 occasions during the crop.

Surprise Checks Carried out at Weighbridges During the Crop

During the crop, 5,797 surprise checks were carried out on the weighbridges and 5,259 lorries were reweighed as well as 538 carts.

VII. Division of Agronomy

Head of Division: Dr. A. L. Owadally, Divisional Scientific Officer

7.1. The Division of Agronomy undertakes agronomic research of economic crops. In the field of crop improvement, seeds of proven varieties are imported and tested for their adaptability to the agroclimatic conditions prevailing in this country and their resistance to pests and diseases. Field experimentations are carried out to improve cultural methods and practices with a view to optimize crop yield.

The Division of agronomy also provides services to other Divisions in the implementation of their research work and the Seed Production programme on the Experiment Stations.

7.2. SCIENTIFIC OFFICER: L. KWAN PUN

7.2.1. *Rice Oryza sativa*

7.2.1.1. *Herbicidal trial*

The experiment was a continuation of that carried out in 1979 with the objective of testing the effectiveness of chemical weed-killers and hand weeding. Two trials were carried out in Belle Vue rice research station. The first trial was conducted from mid February to early June and the next one from late July to mid Janauary. A randomised complete block layout was adopted with three replicates and four treatments in both trials. The treatments were hand weeding as control, Preforan, Ronstar, followed by Totril and Chem rice. The rice cultivation was done under flooded conditions, using direct sowing of pregerminated rice seeds.

7.2.1.2 *Results*

TABLE 7.1

MEAN PADDY YIELD IN METRIC TONS ha—[1]

Treatment	*1st trial*	*2nd trial*
Hand weeding ...	6.90	9.39
Preforan	6.88	8.57
Ronstar+Totril ...	5.89	6.70
Chem rice ...	6.14	9.21
L.S.D 5% ± ...	2.00	2.14
L.S.D. 1% ± ...	3.03	3.24

From Statistical analysis, the paddy yield differences among the treatments did not reach significant level in both trials. The hand weeding treatment gave the highest paddy yields in both seasons in contrast to the treatment Ronstar and Totril which gave the lowest yields. The performances of Preforan were very near to those of hand weeding in term of paddy yields. From observation, Preforan seems to work best when applied to weeds, which are still very young and its toxicity to rice seedlings is negligible. On the other hand, Chem rice seems to work best when the weeds are at a fairly advanced stage and its toxicity to rice plants is slight.

7.3 SCIENTIFIC OFFICER: G. PALLANY

7.3.1 *Tobacco (Nicotiana tabacum L.)*

7.3.1.1 *Variety trial*

A Virginia flue-cured tobacco variety trial, comprising seven varieties, was set up at Richelieu Experiment Station in the first season of 1980. The varieties, namely, N.C. 95, S.C. 66, Speight G28 Speight G41, Coker 86, Coker 347 and Virginia 115, were tested in a randomized block design with four replicates.

For its first performance testing in Mauritius, the newly introduced variety Speight G41 seemed to adapt itself well. Although differences were not always significant, Speight G41 stood up as the best variety in terms of cured leaf quality and gross returns.

In the first season, a decline in the general performance of the two commercially grown varieties N.C. 95 and S.C. 66 was noted. Together with Virginia 115, they were the poorest performers this season.

An analysis of variance was carried out on the fresh and cured leaf yields, the leaf quality and gross returns as a measure of the relative performances of the different varieties. Significant differences, measured at the 5% level, were assessed according to the Duncan Multiple Range Test.

Results indicated a significantly higher yield of fresh leaf for Coker 347 (21, 282 kg/ha) over Virginia 115 (16, 631 kg/ha) and no significant differences between the yields of the other varieties. The cured leaf yields of N.C. 95 (2,346 kg/ha) and S.C. 66 (2,549 kg/ha) were significantly lower than that of Speight G41 (3,380 kg/ha).

TABLE 7.2

PERFORMANCE OF FLUE-CURED TOBACCO VARIETIES UNDER TRIAL

Varieties	*Fresh leaf yield (Tons/ha)*	*Cured leaf yield (Tons/ha)*	*Leaf quality (Rs/kg)*	*Gross Returns (Thousand Rs/ha)*
N.C. 95 ...	18.497	2.589	28.97	75.06
S.C. 66 ...	17.752	2.346	30.02	71.06
Speight G 28 ...	19.712	2.820	29.64	87.79
Speight G 41 ...	19.886	3.380	34.95	116.12
Coker 86 ...	18.757	2.862	30.45	86.53
Coker 347 ...	21.282	2.992	31.45	94.18
Virginia 115 ...	16.631	2.800	30.16	86.07
S.E. of mean ...	±0.758	±0.229	± 2.61	± 8.86

Qualitywise, the best leaves (Rs 34.95/kg) and the highest gross returns (Rs 116,120/ha) were obtained for Speight G 41 while leaves of the poorest quality and the lowest gross returns were recorded for S.C. 66 (Rs 29.64/kg and Rs 71,060/ha respectively) and N.C. 95 (Rs 28.97/kg and Rs 75,060/ha respectively). Differences in the leaf quality figures for all varieties were not significant. The gross returns of Speight G 41, however, were significantly higher than for the rest.

The same experiment was repeated in the second season of 1980.

7.3.1.2 *Control of suckers*

A chemical control of suckers experiment was set up in latin square design at Richelieu Experiment Station in the first season of 1980 and repeated in the second season.

The material used in the study consisted of conventionally topped, flue-cured virginia tobacco variety, N. C. 95. One and/or two chemical applications were required at an interval of one week. The four treatments were as follows: (i) application of systemic chemical, O.M. 30 (ii) application of contact chemical Royaltac, followed by O. M. 30 (iii) application of contact chemical Off-Shoot T-85, followed by O.M 30 and (iv) a hand-desuckering control treatment. Royaltac and off-shoot T-85 were applied at the rate of 2 gallons of product in 50 gallons of water per hectare and O.M. 30 at the rate of 0.47 litres in 33 litres of water per hectare. The parameters used to assess the efficiency of the different products and combination of products were (i) fresh leaf yield (ii) cured leaf yield (iii) leaf quality and (iv) gross returns. An analysis of variance was carried out on these parameters and significant differences measured at the 5% level of significance.

All treatments, including the hand desuckering one, gave satisfactory control. The best yields (22,946 kgs fresh leaf and 3,857 kgs cured leaf per ha) were obtained from the use of Off-shoot T-85 followed by O.M 30. The differences in the fresh leaf yields of the different treatments were not significant, while the cured leaf yield of the best treatment was significantly higher than that achieved with Royaltac followed by O.M. 30 (3,201 kg/ha).

TABLE 7.3

EFFECTIVENESS OF CHEMICAL DESUCKERING AGENTS

Treatments	*Fresh leaf yield (T/ha)*	*Cured leaf yield (T/ha)*	*Leaf quality (Rs/kg)*	*Gross Returns (Thousand Rs/ha)*
O.M 30 ...	22.237	3.748	29.71	111.8
Royaltac + O.M. 30 ...	20.819	3,201	31.78	100.9
Off-Shoot T-85				
+O.M 30 ...	22.946	3.857	29.64	114.4
Control:				
Hand desuckering ...	21.947	3.686	33.34	122.4
S.E. of mean ...	±1.518	±0.194	±0.90	± 6.2

The hand desuckering treatment gave the best quality leaves (Rs 33.34/kg) and the highest gross revenues (Rs 122.400/ha). The leaf quality figure was significantly higher than that of the O.M. 30 (Rs 29.71/kg) and Off-shoot T-85 followed by O.M. 30 (Rs 29.64/kg) treatments. On the other hand, significant difference was found between the gross return figures.

7.3.1.3 *Fertilizer trial*

A fertiliser trial was set up at Richelieu Experiment Station in the first season of 1980 and repeated in the second season. The objective of the experiment was to determine the optimum level of N and K that will maximise yield and gross revenues of flue-cured variety N.C. 95. Three levels of N i.e 30 kg N/ha, 45 kg N/ha and 60 kg N/ha applied in the form of sulphate of Ammonia and three levels of K (120 kg K_2O/ha, 240 kg K_2O/ha and 360 kg K_2O/ha,) applied as sulphate of potash, were tested in a split plot design with four replicates and with N as the main treatment. A basal dose of 100 kg P_2O_5/ha, applied as Triple Superphosphate, made up the phosphorus component.

An analysis of variance was carried out on the same parameters as for the previous experiments and differences assessed at the 5% level of significance. Differences between the treatments in the four analyses were not significant. However, combination N_2K_1 i.e. 45 kg N/ha and 120 K_2O/ha gave the best results (19.030 kg fresh leaf/ha, 3,050 kg cured leaf/ha, Rs 35.00/kg and Rs 104,000.00/ha).

TABLE 7.4

SUMMARY OF RESULTS OF NK FERTILISER TRIAL

Treatments		*Fresh leaf yield (T/ha)*	*Cured leaf yield (T/ha)*	*Leaf qualiiy (Rs/kg)*	*Gross Rcturns (Thousand Rs/ha)*
N_1K_1	...	18.85	3.175	32.23	102.35
N_1K_2	...	19.48	2.800	31.44	88.90
N_1K_3	...	16.08	2.675	32.80	87.78
N_2K_1	...	19.03	3.050	35.50	104.00
N_2K_2	...	17.33	3.100	30.24	93.35
N_2K_3	...	19.00	3.225	30.88	98.50
N_3K_1	...	17.35	2.975	30.02	88.44
N_3K_2	...	19.10	2.950	28.88	85.45
N_3K_3	...	18.40	2.925	29.47	92.175
S.E. of mean	...	± 1.29	±0.238	± 2.16	± 8.090

7.3.1.4 *Performance of variety G 28*

Following good results obtained from flue-cured variety Speight G28 in variety trials, an experiment with the variety was set up at Richelieu Experiment Station in both seasons of 1980. The objective was to assess the performance of Speight G28, when planted in a full stand in view of a possible release for commercial growing.

A plot of about 2,000 plants was planted out and the following measurements taken: fresh and cured leaf yields, leaf quality and gross returns. Data of the 1st season crop brought up on a per hectare basis were as follows:

Fresh leaf yield	=	14,162 kg/ha
Cured leaf yield	=	1,426 kg/ha
Leaf quality	=	Rs 29.62/kg
Gross returns	=	Rs 42,322/ha

Growth was rather stunted. Additional assessments would thus be required.

Sunflower

Experimentation with Sunflower as an oil crop started in the first season of 1980. Six varieties ,namely, Interstate, Hurst gumbrid, Hurst cirobrid, Gor 33, Gor 101 and Gor 104 were tested at Richelieu Experiment Station in a randomized block design with four replicates. The experiment failed as a result of a poor germination of seeds. However, some measurements were taken on the remaining plants and the mean values are tabulated below (Table 7.5).

TABLE 7.5

PERFORMANCE OF SUNFLOWER VARIETIES

Varieties	*Height (cm)*	*Diameter of head in cm*	*Weight of Seeds per head (g)*
Gor 101 ...	147	14	240
H. Gumbrid ...	153	15	150
Gor 104 ...	130	13	245
H. Cirobrid ...	129	16	140
Interstate ...	152	18	135
Gor 33 ...	145	14	245

7.4 SCIENTIFIC OFFICER: J. M. HEERASING

7.4.1 Ginger (Zingiber officinale Roscoe)

7.4.1.1 *Fertilizer trial*

A trial was planted in a Randomised block design with 4 replicates at Central E.S., Reduit, to study the effects of 3 different levels each of potash and phosphate fertilizers on the yield of green ginger. The levels were:

1.0 (Ko), 300 (K1) and 600 (K2) Kg muriate of potash per hectare and 2.0 (Po), 250 (P1) and 500 (P2) kg simple super phosphate per hectare.

Sulphate of ammonia was applied non-limiting at 1000 kg per hectare. Unfortunately, the trail had to be scraped off because of very poor seedling emergence, resulting from the excessively wet conditions, which prevailed at the beginning of the year.

7.4.1.2 *Mulching trial*

Two different mulches were tested in a field trial at Pamplemousses E.S. to study and compare the effects of 2 types of mulch on the yield of green ginger. The mulches were rice straw and cane straw. The trial was conducted in a randomised block design with 4 replicates. Results, showing the mean yield figures obtained, are presented in table 7.6

TABLE 7.6.

COMPARISON BETWEEN THE GREEN GINGER YIELD OF EACH OF 2 TYPES OF MULCH AND CONTROL. PAMPLEMOUSSES E.S. 1980

Treatment	*Mean Yield (t. ha)*
Rice straw	... 31.90
Cane straw	... 27.85
Control	... 25.57
SE of a mean ±	... 2.12

Analysis of data confirmed the previous year's findings (see Annual Report 1979) in that mulching had a positive effect in increasing crop yields, even if the differences were again found to be statistically non-significant at the 5% level. Plots, mulched with canestraw, outyielded unmulched plots by more than 2 tonnes per hectare; with rice straw, a higher yield increase of the order of 6 t/ha was recorded. A similar trial failed at Central Experiment Station, Reduit, because of adverse climatic conditions, as mentioned earlier under 7.4.1.1.

7.5 SCIENTIFIC OFFICER—Y. BOODOO

7.5.1 *Tea—Camellia sinensis (L)* (O. Kuntze)

7.5.1.1. Experiment IIIA : To determine the biological and economic optimal rate of nitrogen application at two levels of phosphate and potash

The experiment was conducted in Field 1 at Wooton and has completed the 2nd year of its 1st cycle. It consisted of the following treatments, allocated in a split-plot design.

Main treatments (192 bushes)		*Split-plot treatments (96 bushes)*	
T_1 ...	200 kg N/ha/yr	$(PK)_1$ ...	30 kg P_2O_5/ha/yr
T_2 ...	250 do		30 kg K_2O/ha/yr
T_3 ...	300 do	$(PK)_2$ ...	90 kg P_2O_5/ha/yr
T_4 ...	350 do		90 kg K_2O/ha/yr
T_5 ...	400 do		

TABLE 7.7

ANNUAL GREEN LEAF YIELD (m. tons/ha) OBTAINED WITH DIFFERENT NITROGEN RATES AT A LOW AND A HIGH PHOSPHATE-POTASH LEVEL (MAY 79-APRIL 80)

(Average of 5 blocks)

	$(PK)_1$	$(PK)_2$	*Mean*
T_1	16.67	16.75	16.71
T_2	16.80	15.82	16.31
T_3	16.74	17.96	17.35
T_4	17.63	17.83	17.73
T_5	17.75	17.02	17.39

C.V. *(a)* 10%; C.V. *(b)* 7%

S.E. of a main treatment mean ± 0.77

S.E. of a split-plot treatment mean ± 0.23

The yields of the main treatments and the split-plot treatments did not differ significantly at 5% P. The maximum yield, however, was obtained with T_3 $(PK)_2$ and the lowest at T_2 $(PK)_2$. Over the average of the two PK levels, the higest yield was obtained at T_4 and the lowest at T_2.

TABLE 7.8

LEAF NO. *3* ANALYSIS *(% D.M)*—JULY *79*

(Average of 5 blocks)

	$(PK)_1$			$(PK)_2$			*Mean*		
	N	*P*	*K*	*N*	*P*	*K*	*N*	*P*	*K*
T_1 ...	3.18	0.336	1.36	3.02	0.344	1.36	3.10	0.340	1.36
T_2 ...	3.27	0.331	1.29	3.34	0.322	1.36	3.30	0.331	1.32
T_3 ...	3.35	0.337	1.40	3.27	0.348	1.30	3.31	0.342	1.35
T_4 ...	3.29	0.335	1.27	3.44	0.349	1.32	3.36	0.342	1.29
T_5 ...	3.30	0.345	1.32	3.41	0.335	1.35	3.36	0.340	1.33

The foliar analysis, corresponding to each treatment and its yield, can be read out from table 7.8. When yield was at its maximum, the NPK foliar analysis was 3.27, 0.348 and 1.30. For the minimum yield, the analysis was 3.34, 0.332 and 1.36. Averaging over both PK levels applied, the maximum yield read 3.36, 0.342, 1.49, while the lowest read 3.30, 0.331 and 1.32.

TABLE 7.9

TOP SOIL ANALYSIS (0-20 cm)—AUGUST 79

(Average of 5 blocks)

	$(PK)_1$			$(PK)_2$		
	N % DM	*P ppm*	*K me/100 g*	*N % DM*	*P ppm*	*K me/100 g*
T_1 ...	0.51	80	0.564	0.60	97	0.769
T_2 ...	0.67	149	0.569	0.61	122	0.626
T_3 ...	0.54	68	0.579	0.69	124	0.600
T_4 ...	0.71	107	0.528	0.65	343	0.595
T_5 ...	0.71	162	0.436	0.70	112	0.477

The soil-test values for any treatment can be read out from table 7.9. The P-values refer to available phosphorus. The higher nitrogenous doses seem to have increased the soil nitrogen and phosphate with a concurrent decrease in the availability of soil potash. The low and high phosphate levels applied did not seem to influence greatly the soil phosphate status. However, a very high soil phosphate was obtained with T_4 $(PK)_2$. The higher K-dose seems to increase the soil-K , especially at lower nitrogen levels.

7.5.1.2 Experiment VB: To determine the effect of time and frequency of application of phosphate and potash on the yield of tea, the nitrogen rate, remaining constant

The experiment was conducted in Fields 16-17 at Wooton and has completed the 2nd year of its cycle. Treatments consisted of a low $(PK)_1$: 30 kg P_2O_5 + 30 kg K_2O/ha/yr) and a high (PK_2): 90 kg P_2O_5 + 90 kg K_2O/ha/yr) phosphate-potash combination applied either throughout pruning cycle, at the start or at the end, as follows:

T_1	...	One-third $(PK)_1$	One-third $(PK)_1$	One-third $(PK)_1$
T_2	...	$(PK)_1$	—	—
T_3	...	—	—	$(PK)_1$
T_4	...	One-third $(PK)_2$	One-third $(PK)_2$	One-third $(PK)_2$
T_5	...	$(PK)_2$	—	—
T_6	...	—	—	$(PK)_2$

TABLE 7.10

ANNUAL GREEN LEAF YIELD (m. tons/ha) AS IT RELATES TO LEAF AND SOIL ANALYSIS

(Average of 4 blocks)

	Yield	*Leaf No. 3 (%DM) July 79*			*Top-soil (0–20 cm) Sept 79*		
	July 79/June 80	*N*	*P*	*K*	*N %DM*	*P ppm*	*K me/100g*
T_1 ...	12.88	3.28	0.335	1.94	0.67	519	0.545
T_2 ...	12.26	3.31	0.351	1.99	0.68	462	0.613
T_3 ...	11.37	3.42	0.347	2.02	0.60	426	0.615
T_4 ...	12.60	3.41	0.349	1.97	0.67	481	0.644
T_5 ...	11.85	2.94	0.335	1.97	0.53	409	0.586
T_6 ...	12.88	3.31	0.339	1.93	0.61	412	0.612

C.V. 6%; S.E. of a treatment mean ± 0.37

The yields of the treatments did not differ significantly at 5% P. The highest yield was obtained with T_1 and T_6 while T_3 gave the lowest yield. The leaf and soil analysis values, corresponding to any treatment, can be read out from table 7.10. There is no big difference in the leaf N-values because a uniform nitrogen dose was applied. The rate and time of phosphate-potash application does not seem to affect the Phosphate and potash levels in the leaf and in the soil considerably.

7.5.1.3 Experiment VII: To determine the optimum time of prune.

The experiment was conducted in Field 4 at Wooton and has completed the 2nd year of its last cycle. The following treatments were allocated to a randomised block design:

T_1 ... Prune mid-March
T_2 ... mid-April
T_3 ... mid-May
T_4 ... mid-June
T_5 ... mid-July
T_6 ... mid-August

TABLE 7.11

ANNUAL GREEN LEAF YIELD (M. TONS/HA) OBTAINED BY PRUNNING AT DIFFERENT MONTHS

(Mean of 4 blocks)

Treatments	*Experimental period*	*Yield*
T_1	15.3.79 — 15.3.80	18.33^{a}
T_2	15.4.79 — 15.4.80	17.16^{ab}
T_3	15.5.79 — 15.5.80	17.65^{ab}
T_4	15.6.79 — 15.6.80	17.44^{ab}
T_5	15.7.79 — 15.7.80	15.55^{b}
T_6	15.8.79 — 15.8.80	16.35^{ab}

C.V. 9%; S.E. of a treatment mean ± 0.78

From Table 7.11., mean yields followed by the same alphabet are not significantly different from one another according to Duncan's Multiple Range test. Only T_1 therefore is significantly different from T_5 at 5% P. When the treatments were grouped in pairs (T_1+T_2 v/s T_3+T_4 v/s T_5+T_6), no significant difference was observed between the yields of early, mid and late pruning.

7.5.1.4 Experiment XI: To determine the effect of different rates of Nitrogen application on the yield of tea at different levels of phosphate and potash.

This experiment has completed the 2nd year of its cycle and was conducted separately under two soil types:

(A) Wooton TES ... Latosolic Brown Forest Soil

(B) Verdun ... Humic Ferruginous latosol

A split-plot design in 4 randomized blocks was used nitrogen as main treatments and phosphate-potash combinations as split-plot treatments:

Main treatments		*Split-plot treatments*	
N_1 ...	100 kg N/ha/yr	P_o ...	0
N_2 ...	200	P_1 ...	90 kg P_2O_5/ha/yr
N_3 ...	300	K_o ...	0
N_4 ...	400	K_1 ...	60 kg K_2O/ha/yr
		K_2 ...	120 kg K_2O/ha/yr

TABLE 7.12

AVERAGE ANNUAL GREEN LEAF YIELD (M. TONS/HA) MAY 79—APRIL 80

(Average of 4 blocks)

	Wooton (28 pluckings)				*Verdun (17 pluckings)*			
	N_1	N_2	N_3	N_4	N_1	N_2	N_3	N_4
P_0K_0 ...	13.97	15.41	15.46	17.46	4.52	6.15	6.77	6.34
P_0K_1 ...	14.46	15.21	15.65	17.66	4.36	5.68	7.09	6.64
P_0K_2 ...	12.59	15.25	16.13	16.35	5.15	5.69	6.65	6.93
P_1K_0 ...	13.53	15.04	16.82	17.02	4.44	5.66	6.56	6.60
P_1K_1 ...	12.49	15.18	16.26	15.42	4.34	6.18	7.05	6.88
P_1K_2 ...	14.17	14.30	15.36	16.46	4.84	5.69	6.93	7.18
Mean ...	13.49	15.06	15.95	16.73	4.61	5.84	6.84	6.76

Wooton (28 pluckings)	Verdun (17 pluckings)
C.V. *(a)* 22%; C.V. *(b)* 16%	C.V.*(a)* 28%; C.V. *(b)* 10%
S.E. of nitrogen mean $\pm$ 1.6	S.E. of a nitrogen mean $\pm$ 0.85
S.E. of a PK mean $\pm$ 0.62	S.E. of a PK mean $\pm$ 0.16

The yields, obtained at Wooton for the main treatments (nitrogen), differed significantly at 5% P. The yield increased linearly with increasing nitrogen doses and no optium was reached. The yield of the sub-treatments, however, did not differ significantly at 5% P for a given nitrogen level. The highest yield was obtained at $N_4P_0K_1$, while the lowest was obtained at $N_1P_1K_1$. No significant interaction was detected between nitrogen and PK effects.

At Verdun, the same trend was observed with the main treatment effects, differing significantly at 5% P and the sub-treatment effects not differing significantly at 5% P. No significant interaction was found between the main and the sub-treatments. The very low yields, obtained at Verdun, can be accounted for by the young age of the tea, the lower featility status of latosols and the lesser number of pluckings.

TABLE 7.13

LEAF NO. 3 ANALYSIS (% DM)

(Average of 4 blocks)

Over all levels of PK

	Wooton (July 79)			*Verdun (Aug. 79)*		
	N	*P*	*K*	*N*	*P*	*K*
N_1 ...	3.07	0.332	2.09	2.40	0.299	2.00
N_2 ...	3.28	0.332	2.08	2.85	0.310	1.95
N_3 ...	2.87	0.337	2.09	2.89	0.317	1.96
N_4 ...	3.24	0.350	2.11	3.24	0.303	1.98
Mean ...	3.11	0.338	2.09	2.84	0.307	1.97

Over all levels of N

	Wooton (July 1979)			*Verdun (Aug. 79)*		
	N	*P*	*K*	*N*	*P*	*K*
P_0K_0 ...	3.17	0.335	2.09	2.90	0.308	1.89
P_0K_1 ...	3.15	0.339	2.10	2.74	0.307	2.02
P_0K_2 ...	2.88	0.338	2.11	2.83	0.305	2.03
P_1K_0 ...	2.95	0.338	2.06	2.78	0.317	1.93
P_1K_1 ...	3.19	0.338	2.08	2.92	0.303	1.98
P_1K_2 ...	3.34	0.338	2.11	2.86	0.303	1.97
Mean ...	3.11	0.338	2.09	2.84	0.307	1.97

From table 7.13, it is clear that leaf nutrients levels at Verdun for any treatment applied, are lower than at Wooton. Leaf NPK at Verdun are lower by 5%, 9% and 6% respectively. The lower nutrient extraction ability, exhibited at Verdun, may be due to the immaturity of the tea-plants and may also be a direct result of the soil characteristics.

TABLE 7.14

TOP-SOIL ANALYSIS (0-20 cm) (AVERAGE OF 4 BLOCKS)

Over all levels of PK

	Wooton (Aug. 79)			*Verdun (Sept. 79)*		
	N % DM	*P ppm*	*K me/100g*	*N % DM*	*P ppm*	*K me/100g*
N_1 ...	0.68	170	0.79	0.61	255	0.82
N_2 ...	0.70	194	0.65	0.58	241	0.66
N_3 ...	0.76	293	0.55	0.56	316	0.56
N_4 ...	0.73	145	0.55	0.56	258	0.58
Mean ...	0.72	200	0.63	0.58	267	0.65

Over all levels of N

	Wooton (Aug. 79)			*Verdun (Sept. 79)*		
	N % DM	*P ppm*	*K me/100g*	*N % DM*	*P ppm*	*K me/100g*
P_0K_0 ...	0.73	171	0.63	0.56	206	0.68
P_0K_1 ...	0.70	131	0.66	0.65	361	0.72
P_0K_2 ...	0.69	160	0.74	0.55	162	0.57
P_1K_0 ...	0.69	217	0.61	0.54	198	0.58
P_1K_1 ...	0.80	253	0.60	0.59	359	0.67
P_1K_2 ...	0.68	271	0.57	0.57	317	0.69
Mean ...	0.72	200	0.63	0.58	267	0.65

The soil nitrogen at Wooton is higher than at Verdun, while the potash status seems to be the same at both experimental sites. However, the phosphate availability at Verdun seems to be higher; but this is not borne out by the leaf analysis data. Under both soil types, the depressing effect of the higher levels of ammonium sulphate on potash availability, is apparent.

7.5.1.5 Experment XIII : To determine the effect of different rates of nitrogen, phosphate and potash on th yield of tractor-plucked tea.

This experiment has been implemented at Mexico, Bois-Cheri, when tea is mechanically plucked by tractor. Experimental strips are 5 ft. wide and thier lengths vary from 458 ft to 403 ft. The following treatments have been allocated to a split-plot design :

Main trcatments	*Split-plot treatments (PK combinations)*
N_1 ... 250 kg N/ha/yr	P_1 ... 30 kg P_2O_5/ha/yr
N_2 ... 300 do	P_2 ... do
N_3 ... 350 do	K_1 ... 30 kg K_2O/ha/yr
N_4 ... 400 do	K_2 ... 90 do

Leaf and soil samples were taken from each plot prior to starting the experiment and the results are shown below :

TABLE 7.15

LEAF ANALYSIS (MAY 80)

	(% DM)					(ppm)			
Leaf 3	*N*	*P*	*K*	*Ca*	*Mg*	*Zn*	*Cu*	*Fe*	*Mn*
Block 1 ...	3.05	0.311	1.85	0.44	0.28	23	12	58	435
Block 2 ...	2.95	0.287	1.80	0.44	0.28	18	12	56	435
Block 3 ...	3.29	0.306	1.83	0.44	0.28	18	13	60	395
General mean ...	3.10	0.301	1.83	0.44	0.28	20	12	57	422

	(% DM)					(ppm)			
Mature Leaf	*N*	*P*	*K*	*Ca*	*Mg*	*Zn*	*Cu*	*Fe*	*Mn*
Block 1 ...	2.55	0.222	1.50	0.55	0.28	15	10	56	526
Block 2 ...	2.51	0.209	1.43	0.55	0.28	13	9	59	534
Block 3 ...	2.59	0.214	1.50	0.54	0.27	14	10	62	543
General mean ...	2.55	0.215	1.48	0.55	0.28	14	10	59	534

TABLE 7.16

SOIL ANALYSIS (MAY/JUNE 80)

	Top-soil (0–20 cm)			*Sub-soil (20–60 cm)*		
Block 1 ...	N%	P ppm	K me/100g	N%	P ppm	K me/100g
Block 2 ...	0.77	41	0.70	0.71	30	0.60
Block 3 ...	0.76	33	0.65	0.62	30	0.56
General mean ...	0.75	40	0.62	0.60	29	0.52

7.5.1.6. *Clonal Selection*

Polyclonal seed-garden

In view of the establishment of a polyclonal seed-garden, 70 seed-bearers have been selected at De Rauville seed-garden.

7.5.1.7. *Clonal Trial*

100 cuttings of each of the following 48 mother-bushes have been potted in the nursery : OB 1, 2, 11, 13, 18, 19, 26, 29, Special Assam, SR 7U 9/2, TCL 30/4, 7A/33, 203, 52, 239, 212, 164; Fla/471, 651, 555, 395, 311; F9/42, 56; F6A/97; OB 12, 22, 4; F4/273, 275, 188, 77, 103; F6A/95; F3/356, 58; OB 9; 4/291, 278, 276; 6/66, 16/24, 16/35, 18/47, 16/80, 18/1, 18/71, VP1H.

7.6 SCIENTIFIC OFFICER : H. ROJOA

7.6.1 *Fodder and Grasses*

7.61.1 Acacia *(Leucaena Leucocephala* (L.) De Wit.)

Two experiments were being carried out to study the different agronomic aspects of acacia *(Leucaena leucocephala)* : *(a)* Spacing trial (Guatemala variety) and *(b)* variety trial cum spacing and cutting heights of plants.

Spacing trial (Peru variety)

This trial started in June 1977 and is still under study. The objective of this experiment was to determine the optimum spacing of acacia, variety Guatemala. The treatments were 90, 180, 270 and 360 cm between rows, replicated five times. The seedlings were thinned after emergence to 50 plants per meter length.

Results

The yield of fresh weight of shoot for the year 1980 were tabulated (Table 7.17).

TABLE 7.17

EFFECT OF ROW SPACING OF PLANT ON SHOOT PRODUCTION OF ACACIA, VAR. PERU

Row spacing (cm)		*Mean fresh height*		*Dry weight*
		K/plot	*Kg/ha*	*Kg/ha*
90 (T_1)	...	489.8	54.4	17.95
180 (T_2)	...	433.4	48.2	15.90
270 (T_3)	...	327.6	36.4	11.01
360 (T_4)	...	335.6	37.3	12.30
Cv%	...	7.8		
LSD: 5%	...	41.09		
1%	...	56.16		

The results showed that treatment T_1 gave a significantly higher yield ($P=0.01$) than T_2, T_3 and T_4.

At wider spacing, i.e. T_3 and T_4, the yield of fresh weight of shoot was not siguificantly different from each other. The data tend to show that smaller spacing is better for acacia, guatemala variety, than a wider one.

Chemical analyses show that there was no difference in the nutritive value of the harvested vegetative material in the different treatments. The average dry matter was 33%, crude protein 24%, and crude fibre 18%. The results were expressed on dry matter basis.

7.6.1.2 Variety trial cum spacing and cutting heights of plants.

Two varieties of acacia—Peru and Cunnigham—were under investigation at Richelieu Experiment Station. The experiment was compounded with two row-spacings of 90 and 180 cm and three cutting heights—15, 45 and 60 cm from ground level. The experiment was laid out in May, 1980.

Germination percentage in the Cunnigham variety was rather low as compared to Peru variey, although the germination of the latter was not satisfactory. It is probable that the seeds were either planted too deep in the soil or that the soil moisture was not enough for proper germination. On two occasions, recruiting was done to maintain an even plantation throughout the experimental area.

The first cutting was done in mid December, 1980, and no conclusions may be drawn at this stage.

7.6.1.3 *Seed Production*

Dry pods from K8 were collected from observation plots, planted in August, 1977, as reported in the Annual Report 1979 (Para. 7.19.2). Acacia seeds from Cunningham variety were collected from different fields, planted under this variey; fifty seven kilos of seeds were collected and sent to Barkly Experimental Station. Three kilogrammes of seeds of K8 variety was also sent to Barkly Experiment Station for storage.

7.6.2 *Sweet Potato (Ipomea batata)*

Interest on sweet potato as an unconventional source of fodder increased. Consequently, an investigation was carried out to determine the best varieties of sweet potato as a source of fodder.

Variey trial of sweet potato

The experiment consisted of six varieties of sweet potato, replicated five times. Primary results were reported in the Annual Report, 1979, paragraph 7.18. The experiment ended in June, 1980.

Results: The fresh weight of vine, harvested during three harvests viz. 28.3.79, 2.10.79 and 26.6.80, are shown below.

TABLE 7.18

Yield potential of vines of six varieties of sweet potato

Varicties		*(Kg/plot) Mean Yield*	*(Fresh Weight) Kg/ha*
Kwang Tang	...	150.92	25.20
Chain	...	191.28	31.94
Little leaf	...	133.34	22.27
White starch	...	89.66	14.97
Yue Yoon	...	112.4	18.77
Leeks	...	111.76	18.67
Cv	...	2.10%	—
LSD: 5%=32.39	...	—	—
1%=36.19	...	—	—
0.1%=48.15	...	—	—

The data showed that variety Chain was the best, giving a yield of 31.94 m. ton/hectare. The yield of vine in Chain variety was significantly higher than Kwan Tang (P=0.01), Yue Yoon, leeks and white starch (P=0.001). White starch gave the lowest yield, 14.97 tons/hectare. The mean dry weight (14.0%) and the crude protein content (10.4%) were given in the Annual Report, 1979.

As a consequence of the above result, an experiment with Chain variety was designed to investigate the influence of mode of planting (flat and ridge) and spacing (90×30; 60×30, and 30×30 cm) on the yield of vegetative matter. The experiment was planted in October, 1980.

CUREPIPE EXPERIMENT STATION

7.7 Officer in Charge—Senior Technical Officer, P. Hanoomanjee

7.7.1 *Location*

Latitude : 20°19′ 54″

Longitude: 57°30′ 30″

Altitude : 1,830 ft

7.7.2 *Climate*

The station is situated in the super-humid zone with an average annual rainfall varying between 3,048 mm and 4,064 mm (i.e. 120 and 160 inches). The number of wet days was above 200.

7.7.3. *Soils*

The soils at the Curepipe Experiment Station are mostly derived from grey doleritic basalts through the process of laterisation. Soils vary in colour from yellow to reddish brown. They are residual, the original high clay fraction of 70-80 per cent being reduced by leaching to some 40 per cent with a consequent increase in iron concretions. A feature of the soils is that, though the clay fraction is high, texture and absorption are good. As upland soils, they are deficient in available phosphorous and potash. The fertility is very low, pH varies between 4.5 and 6.0.

7.7.4 *Weather conditions*:

The total rainfall was 4,107.5 mm (i.e. 162 inches). The highest rainfall was during the month of January (1,317.8 mm) and the lowest rainfall was during the month of December (75.9 mm). The monthly rainfalls are compared with the average normal rainfall for the period 1964-79, as indicated in the appendix section.

7.7.5 *Seed production*

Fruits and seeds of the following were sent to the Barkly Experiment Station: Calebasse—459 units, Pumpkin—649 units, Margoze C.A.M. (Seeds) —300g., pipengaille—257 units, Cucumber white—3,252 units, Brede de chine frisee select—43,200 kg., Brede de chine frisee—1,084.95 kg, Beans Long Tom (rough cleaned seeds)—1,480 kg.

7.7.6 *Sales of Produce*

The following vegetables were sold to the public and the total income derived amounted to Rs 34,614.30. Pumpkin—538 kg, Kew-choy—78 kg, Cucumber—969 units, Chillies cari—24 kg, leeks—1,735 units, Duck's Egg—504 units, choudrageons—6 units, watercress—1,170 kg, spinach—102½ kg, calebasse—90½ kg, songe—64½ kg, pipengaille—47½ kg, lalo—½ kg, yard long beans—3 kg, sweet potato (s.m.)—149 kg, sweet potato local—7,274 kg, ducks—162 kg, Arouille violette—485 kg, groundnuts—37 kg, Arouille cari—276 kg, Geese—9¾ kg, Coriander—11 kg, Rave Blanche—1,001 units, Beans long tom——921½ kg, Radish—495 units, winged bean—2½ kg, Brède de Chine Frisée—29 kg, Brède de Chine saleé—33½ kg, shallot—36¼ kg, Petsai—967 units, lettuce—4,579 units, Cabbage—1,831 units, squash—2,456 units, Mandarine—2 kg, Brède Kotachee—1 kg, Cauliflower—968 units, Arrow root—48 kg, strawberry—73½ kg, Brède Hamchoy—475½ kg, Bréde baton blanc—18½ kg, Peas local—178½ kg, Peas chinese—16½ kg, Cowpeas—52 kg, Carrot 105½ kg, leeks (Italian giant)—1,365 units, Pine-Apple—48 units, Maize cobs—52 units, Potato—3,125 kg, Bananas—168 units.

7.7.7 *Fodder*

1,390.6 metric tons of setaria grass were supplied to the Curepipe Livestock Breeding Station and 362.5 metric tons to the Division of Veterinary Services, Réduit. In addition, 21 metric tons of setaria grass were also supplied to the Richelieu Livestock Breeding Station.

7.7.8 *Livestock*

A population of 102 ducks and 6 geese were maintained and kept for experimentation by the Animal Production Division.

TABLE 7.19

WEATHER RECORDS

7.7.9 Rainfall—monthly total (mm) and difference from normal

Month	*Rainfall*	*Average normal (1964–79)*	*Difference from normal*
January ...	1,317.8	469.8	+848
February ...	650.3	362.7	+287.6
March ...	652.4	452.7	+199.7
April ...	362.8	451.0	— 88.2
May ...	160.8	311.9	−151.1
June ...	147.5	241.8	— 94.3
July ...	238.9	227.4	+ 11.5
August ...	121.7	245.7	−124.
September ...	149.1	154.5	— 5.6
October ...	140.5	105.8	+ 34.7
November ...	89.8	106.9	— 17.1
December ...	75.9	348.7	−272.8
	4,107.5		

PLAISANCE EXPERIMENT STATION

7.8 OFFICER IN CHARGE—SENIOR TECHNICAL OFFICER, P. HANOOMANJEE

7.8.1 *Location*:

Acreage ... 18.96 arpents

Soil type ... Latosolic Reddish Prairie

Region ... Humid

Altitude ... 50 feet above sea level

7.8.2 *Climate*:

Exceptional conditions prevailed during the months of January, March and April, as indicated by the high rainfall recorded.

The total rainfall obtained during the year was 2595.9 mm.

7.8.3 *Development*

An irrigation net work has been laid down throughout the whole station and the water supply will be obtained soon.

7.8.4 *Cropping programme*

The following crops were planted for seed production.

Mustard cabbage, variety Hamchoy	...	1940 holes
Celery cabbage, variety distins	...	1160 m^2
Lalo, variety local ...	...	500 holes
Peas, variety local ...	...	1.04 Ha
Peas, variety chinese ...	...	0.99 Ha
Groundnut, variety cabri ...	...	1811.4 m^2

7.8.5 *Disposal of produce*

To Plaisance Demonstration Centre for sale.

Coconut shoots—24 units, coconut (culled and dropped)— 452 units, Banana—260 units, Breadfruit—32 units, Maize—83 units, Lettuce—179 units, cucumber—238 units, Winged beans—540.5 kg, sweet potatoes—16.0 kg, Mustard cabbage (Hamchoy)—108.5 kg, Beans—76.8 kg, Garlic—16.0 kg, Peas local (green)—10.75 kg, Oranges—1.25 kg, Mandarin— 0.60 kg, Lemon—2.5 kg.

To Réduit E.S. :

Onion Seeds — 0.450 kg (for planting)

To Curepipe E.S.:

Garlic 3.5 kg (for planting)

To Barkly E.S. (Production of seedlings)

Coconut (Malayan Dwarf yellow) ...	93 units	
Coconut (Malayan Dwarf Red) ...	45 units	
	For seed Production	
Lalo Clemson spineless	8.5 kg	
Groundnut variety cabri ...	2759.0 kg	
Peas variety local	633.0 kg	
	38.0 kg	decorticated
Peas variety chinese	482.0 kg	
	59.0 kg	decorticated
Mustard cabbage variety Hamchoy	29.5 kg	
Celery cabbage variety distins ...	36.0 kg	

7.8.6 Weather records.

TABLE 7.20

MEAN MONTHLY RAINFALL FOR 1980

Month	*Rainfall (mm)*
January	1025.1
February	96.0
March	476.6
April	347.8
May	80.6
June	81.2
July	126.4
August	72.0
September	84.0
October	78.0
November	39.0
December	89.2

CENTRAL EXPERIMENT STATION

7.9 OFFICER IN CHARGE—SENIOR TECHNICAL OFFICER, L.C.M. LI TING WAI

7.9.1 *Location*

The Station covers an area of about seven hectares and lies 1,020 ft. above sea level in latitude 20° 13′ 45″ and longitude 57° 29′ 15″. The soil is of the low humic latosolic type.

7.9.2 *Climate*

The total rainfall recorded during the year amounted to 2244 mm. as compared to 1567 mm. (average normal). The month of January was very wet and 893 mm. were obtained.

7.9.3 *Cropping progamme*

(a) Orchards

Routine maintenance work was carried out in all orchards, i.e. citrus, banana, avocado, peach. Due to cyclonic conditions, which occured in January, most of the fruits dropped down.

(b) Fodder

The grass and legumes collection were also maintained. Seeds were collected in some legume varieties and sent to Barkly E.S.

(c) Seed production

The seed production programme was carried out, according to the approved cropping calendar : Brede de chine va. Hamchoy, Onion va. Red creole, Beau va. Noorimbee, cabbage, garlic va. Feng Shan sel No. 1, garlic va. Feng Shan sel No. 2, garlic Rodrigues, tomato va. money maker, Bean va. comprise,lettuce va. mignonette, tomato va. v/c venus, Beetroot, lettuce va. sucrine, Petsai distins, squash va. golden custard, beetroot stecklings, salsify, cucumber white, sweet pepper va. dunputh, coriander, patole, carrot stecklings, pumpkin, lalo va. clemson's spineless, pipengaille, Hot pepper va. carri, asparagus bean, margoze va. gaileung, Pomme d'amour local, margoze local.

In addition, the following were planted in small quantities for observation : water melon, melon, petsai, cabbage, leafless pea, lettuce and sweet pepper.

7.9.4 *Experiments*

The following were carried out with the help from the staff of the station.

(a) By Agronomy and Horticulture Divisions

1. Planting date trial on garlic var. Pooning;
2. Variety trial with four varieties of garlic;
3. Trial on the frequency of harvest of beans var Long Tom;
4. Planting date trial on four varieties of beans;
5. A variety evaluation trial on soy beans;
6. Observations on the following :—purple passion fruits, 5 var. of cabbage 6 var. of cauliflower, 1 var. of papaya, 5 var. of strawberry, 5 var. of carrots, 2 var. of peas, 2 var. of pole bean, 2 var. of dwarf bean, 2var. of bush lime bean, 2 var. of peanut, 1 var. of egg plant, 1 var. hot pepper, nine var. of lettuce, 4 var. of cabbage, 6 var. of cauliflower, 4 var.of grapes, egyptian onion.

(b) By Plant Pathology Division

1. Fungicide trial on onion var Red creole;
2. Fungicide trial on garlic var Rodrigues;
3. Effect of potato virus Y on 2 var. of sweet pepper;
4. Observation on the performance of local and imported potato seeds var. Up to Date in relation to virus diseases.
5. Two trials to evaluate a suitable control of early-late blight on tomato var. FP_1;
6. Assessment of disease resistance to halo blight on 3 var. of beans.

(c) By Entomology Division

1. Insecticide trial to control Lyriomiza trifolii on bean.

7.9.5 *Disposal of Produce*

The following were sent to Barkly Experiment Station for seeds: Okra var Clemsons spineless—106.0 kgs, Bringel var farcie—27.7 kgs, Hot pepper var carri—5.845 kg, Pumpkin—283 units, cucumber white—7,876 units, groundnut var cabri—710.5 kgs, patole—341 units+372.5 kgs, grapefruits—200 units, Bean var Noorimbee—847.0 kgs, Brède de chine var Hamchoy—74.65 kgs, Bean var comprise—20.5 kgs, centrosema pubescens—0.715 kgs, desmodium intortum—1.975 kgs, desmodium oralifolium—1.050 kgs, glycine javanica—1.300 kgs, tomato var. money maker—300.475 kg, tomato var. v/c venus—340.525 kg, garlic var. Pooning—55.0 kg, garlic var. Rodrigues—124.0 kg, garlic var. Feng Shan sel No. 1—883.7 kg, garlic var. Feng Shan sel No. 2—831.3 kg, Squash var. golden custard—1125 units, beetroot—206.0 kg, Petsai distins—328.0 kg, lettuce sucrine—11.250 kg, lettuce mignonette—0.955 kg, cabbage—192.0 kg, margoze var. gaileung—538.9 kg, cotomili—7.1 kg, sweetpepper var. Dunputh—976 units, leafless peas—0.555 kgs, tomato var. FP_1—193.0 kg.

In addition 644.0 kgs of ginger were sent to Richelieu experiment station for storage.

The sale of produce during the year amounted to Rs 10,363.30

7.9.6 *Weather records*

TABLE 7.21.

MEAN MONTHLY RAINFALL—1980

Month	*Rainfall (mm)*	*Average normal (mm)*
January ...	893	289
February ...	268	268
March ...	500	297
April ...	136	138
May ...	83	83
June ...	89	82
July ...	29	78
August ...	Nil	59
September ...	89	59
October ...	48	39
November ...	81	89
December ...	28	209
TOTAL ...	2244	1688

RICHELIEU EXPERIMENT STATION

7.10 OFFICER IN CHARGE :—SENIOR TECHNICAL OFFICER, D. GAYA

7.10.1 *General*

The station is situated in the North West part of the island at an elevation of 220 ft above sea level. The climate is excessively dry, annual rainfall being in the region of 30 ins, (750 mm) most of which falls in January, February and March. The driest months are October, November and December. The soil is reddish and classified as Low Humic Latosol. (Richelieu family).

7.10.2 *Weather conditions*

The climatic conditions for the crops throughout the year were satisfactory. The implementation of the cropping programme has also been facilitated by the supply of irrigation water from La Ferme Reservoir all year round. (except as from the 7th December). The total rainfall recorded this year amounted to 1494.0 mm.

In January, 756.9 mm of rainfall was recorded following the passage of cyclone 'Hyacinthe'.

7.10.3 *Tobacco*

The crop in summer was mainly for seed production. The area planted and the quantity of seed, produced for each variety, is given below.

Variety	*Type*	*Field No.*	*Area (H)*	*Seed produced*
NC 95 ...	Flue cured ...	B2F3 ...	1.06	24.20 kg
Sc 66 ...	Flue cured ...	B2F3 ...	0.09	0.80 kg
Yellow mammoth ...	Flue cured ...	B2F3 ...	0.09	0.45 kgs
SPG 28 ...	Flue cured ...	B2F3 ...	0.01	0.85 kgs
Amarello ...	Air cured ...	B2F3 ...	0.32	1.55 kgs
			1.57	27.85 kgs

The second season started in September and consisted of 0.72 hectare NC 95; 0.27 hectare SPG 28.

The leaf quality was good; since the average price per kg of flue cured obtained was Rs 30.45 (Price per kg of Bu F1=Rs 41.50). The fuel consumption was fair, averaging 2.62 kgs of cured leaf per gallon of gas oil plus0.11 cord of firewood which is equivalent to Rs 3.08 per kg of dried leaf. The average price per kg of air cured obtained was Rs 12.16 which is considered to be good. (Price/kg of Br_1=Rs 13.60)

7.10.4 *Groundnut*

1.94 hectares of groundnut variety local cabri was planted for seed production. A fair crop is expected and will be harvested next year.

7.10.5 *Maize*

2.5 hectares of local maize was grown as fodder for Richelieu livestock breeding station.

7.10.6 *Potato*

Area: 1 arpent. Variety: 'Delaware'. Object: to determine the yield potential and storage quality at different planting dates.

7.10.7 *Canes*

All sugar cane plantations (5.5 Hectares have been kept as fodder for feeding cattle at the Richelieu Livestock Breeding Station. 196 tons of fodder was supplied. During the year 2.5 hectares of sugar cane variety M555/60 was planted whereas 2.6 Ha of variety M13/56 was uprooted in September for rotation with tobacco crop. 1.5 Ha of cane planted was intercropped with maize to be used as fodder also.

7.10.8 *Orchards*

Routine maintenance work was carried out in all orchards. The cultural operation such as weeding, pruning, irrigation and control of pests and diseases were done regularly.

A drip irrigation system was installed in a new litchi orchard in B2F6. The amount of water delivered per hour to each plant by 4 micro tubes is 8 litres. The duration of irrigation determines the amount of water given to the tree.

7.10.9 *Vegetable seed production*

The production of vegetable seed was carried out according to cropping programme. All produce were sent to Barkly Experiment Station and are listed in paragraph—disposal of produce. The yield of bean variety Long Tom was affected by the serpentine leaf miner *Liriomiza trifolii*. A low yield in water melon was also obtained as a result of the cut off of water supply from La Ferme reservoir during the month of December.

7.10.10 *Fodder*

(a) Acacia: An area of 6.6 ha was planted under acacia variety Cunningham for fodder to be supplied to LBS. 3.0 ha have been put under maize as an interrow crop. It is to be noted that the spacing between the rows is 6 ft to enable mechanical harvesting. 9.809 kgs fodder was supplied during the year.

(b) Elephant grass *(Pennisetum purpureum)*

0.68 ha was planted with elephant grass and was intercropped with maize. 1,500 kgs elephant grass were supplied to RLBS during the year. 25,000 kgs maize fodder were supplied to RLBS.

7.10.11 *Asparagus*

A new plantation covering 150m² has been established in B1F1 from seeds collected from previous plantation.

7.10.12 *Sweet Potato*

The varieties chain, Joes, little leaf; chestnut were planted in nursery with the object of producing enough planting material to provide other stations or planters.

7.10.13 *Disposal of Produce to Barkly Experiment Station*

Margoze seeds—124.9 kg, chillies cipaye—41.0 kg, Groundnut local cabri—3854.0 kg, coconut M.D.E.—14 units, acacia seeds—755.0 kg, coto-mili—1025.5 kg, onion bulbs—25.0 kg, onion seeds—0.63 kg, lettuce mignonette—13.50 kg, pomme d'amour local—7,943.2 kg, tomato margloble—86.2 kg, P. d'amour Vc venus—11.5 kg, P. d'amour FPI—11.0 kg, cabbage seeds—277.1 kg, B. de chine bouquet—349.5 kg, Beans noorimbee—71.0 kg, Beans Long Tom—1636.0 kg, cowpeas—146.0 kg, Lady finger—21.0 kg, water melon—1885 units, tomato money maker—26.4 kg.

EXPERIMENTS BY DIVISION OF AGRONOMY

7.10.14 *Tobacco*

(1) One variety trial to compare the yield; leaf quality and the gross returns of seven varieties of the cured tobacco. (NC 95; Coker 34) SPG 41; Virginia 115; Sc 66; Coker 86 and SPG 28). This experiment was repeated in October 1980.

(2) One fertilizer trial to determine the optium combination of Nitrogen and potash to maximise gross returns of variety Nc 95—This experiment was repeated in October 1980.

(3) One experiment on chemical control of suckers; chemicals used are Royal tact, off shoot T 85and O.M. 30—This experiment was repeated in October 1980.

(4) One experiment on flue cured variety SPG 28 to determine its performance on yield; leaf quality and gross returns. Experiment repeated in October 1980.

(5) One experiment on the application of Ethephon on NC 95. to assess yield; leaf quality and gross returns. Experiment repeated in October, 1980.

7.10.15 *Sweet Potato*

A special trial on sweet potato variety chain on forage yield as influenced by modes of planting and spacing. The experiment was repeated in October, 1980.

7.10.16 *Acacia*

An experiment to investigate the production potential of two acacia varieties Peru and Cunningham at different row spacing and cutting heights.

7.10.17 *Sunflower*

A variety trial to compare the yield and oil content potential of six varieties of sunflower. (GOR 104; GOR 101; GOR 33; Interstate Hurst cirobrid and Hurst gumbrid).

7.10.18 *Onion*

(a) An experiment to study the effects of two planting dates on March setts—(Local red) with four rates of Ethephon. (0; 1000; 2000; 3000 ppm).

(b) An experiment to study the interaction of four different planting dates and five cultivars of onion on yield; size and keeping quality of bulbs. (Pyramid; Hojem; local red; Bon accord; Pretoria grano).

7.10.19 *Potato*

One experiment to determine the yield potential and storage quality of variety 'Delaware' at different planting dates.

7.10.20 *Peanuts*

An observational trial on peanut (variety spancross)

EXPERIMENTS BY DIVISION OF HORTICULTURE

7.10.21 *Onion*

(a) An observational trial on six varieties of onion (Red Granex; Henry's special; Dessex; Texas Grano; Red creole; and Tropicana).

(b) A variety trial on five varieties of onion to determine yield potential (Hojem; local red; Bon Accord; Pyramid and Pretoria)

(c) An observational trial with different planting dates on six varieties of onion (Red granex; Henry's special; Dessex; Texas Grano, Red creole and Tropicana).

7.10.22 *Tomato*

A spacing variety on four cultivars of tomato. (Local; FP1; Vc venus; Kapok No. 3). This experiment was repeated in November, 1980.

7.10.23 *Papaya*

An observational trial on variety sunrise.

7.10.24 *Melon*

An observational trial on nine varieties (Cantaloupe Gusto; Cantaloupe 45; Cantaloupe Jumbo Halesbert; Cantaloupe Halesbest; Cantaloupe Zucherino—Charentais; Inverno verde; Inverno griallo; Retato degly ortolani and Hurst No. 339).

EXPERIMENT BY PLANT PATHOLOGY DIVISION

7.10.25 *Onion*

A fungicide trial with DM 45 at different concentrations on four varieties of onion. (Red creole; Bon accord; Hojem and Tropicana).

7.10.26 *Tobacco*

A fufngicide trial to control damping off of tobacco variety NC 95—chemicals used—Vapam; Ridomil 5 G; Ridomil 25 wp; Ridomil/Captan; Experiment repeated in August, 1980.

7.10.27 *Development*

(a) A concrete wall was erected in B2F1 after the destruction of the chain link fence by cyclone 'Claudette'

(b) A concrete platform was built as a base for a tobacco bulk curer.

7.10.28 *Disposal of Produce*

The sale of produce amounted to Rs 137,446.44.

7.10.29 *Weather Records*

TABLE 7.22.

MEAN MONTHLY RAINFALL, TEMPERATURE AND RELATIVE HUMIDITY FOR 1980

Month	*Rainfall*	*Min. temp.*	*Max. temp.*	*Average*		*Average R.H.*
				Max.	*Min.*	
	(mm)	°c	°c	°c		%
January ...	756.9	23.8	28.3	32.0	19.2	77
February ...	70.2	23.4	29.5	31.2	20.0	84
March	308.2	24.0	28.9	31.0	22.8	84
April	166.1	22.6	26.8	30.0	21.0	80
May	112.7	21.5	26.2	29.3	17.0	73
June	14.4	18.7	20.8	26.8	16.0	75
July	9.0	21.3	24.9	27.0	15.0	66
August	6.8	17.2	24.9	26.0	15.5	65
September ...	6.9	18.6	25.2	27.0	17.0	61
October ...	32.4	19.8	26.9	29.0	17.0	68
November ...	15.9	19.9	28.8	31.0	18.5	68
December ...	15.3	20.9	30.3	31.8	18.0	75

TEA EXPERIMENT STATION—WOOTON

7.11. Officer in Charge : Senior Technical Officer—*J.* Dindoyal

7.11.1 *Location*

The Tea Experiment Station is found along the main road from Curepipe leading to Quartier Militaire at an elevation of 1,850 feet above sea level within the annual rainfall range of 3,800 mm. The climate is rather cool and the average daily sunshine is of six hours. The soil is of Latosolic Brown Forest type.

7.11.2 An area of 68 arpents is under tea of which 7 arpents were used for experimental purposes during the year.

7.11.3 *Nursery*

The nursery has been converted into fields.

7.11.4 *Weather Conditions*

1980 was a year of heavy rainfall, cyclones and drought. January was an exceptionally wet month with 22 rainy days and precipitation of 1,421.5 mm. (56.9 inches), which was far more than double the normal for the month 530 mm. (21.2 inches). Cyclonic condititons prevailed on the island during the passage of cyclones Hyacinthe (27th January, 1980), Jacinthe (3rd February, 1980) and Laure (13th March, 1980. The wettest day of the year was on 24th January, 1980 with a precipitation of 170 mm. (6.55 inches). On the other hand, the last two months of the year were very dry, but still the total rainfall for the year 4633.8 mm. (186 inches) was above normal 3,960 mm. (158.4 inches).

TABLE 7.23

Weather Records—1980

Month	*Rainfall (mm)*	*Sunshine (hrs) Average daily*	*Temp. °C*		*% RH*	*Soil Temperature °C*		
			Min.	*Max.*		*4*	*8*	*12*
January ...	1421.5	5 hrs	19.9	27.2	89.5	24.4	24.8	26.2
February ...	648.5	6 hrs 48	18.7	26.7	82.3	24.5	25.2	25.7
March ...	687	3 hrs 37	19.8	27.1	88.2	24.4	25.1	25.8
April ...	383.5	4 hrs 12	18.5	25.2	89.6	24.3	25.0	25.6
May ...	435.0	5 hrs 07	16.1	23.5	87.4	21.7	21.9	23.1
June ...	128.7	6 hrs 06	14.5	20.1	80.6	19.9	21.5	21.7
July ...	228.7	5 hrs 26	13.6	18.5	83.4	18.1	19.2	20.9
August ...	106.7	6 hrs 10	13.1	18.4	87.5	17.4	18.1	20.8
September ...	180.5	5 hrs 42	14.0	20.2	89	18.6	19.7	20.4
October ...	158.7	6 hrs 57	15.8	23.7	81.7	18.8	19.7	20.2
November ...	132.0	6 hrs 07	16.7	23.5	82	22.9	23.4	23.9
December ...	123.2	6 hrs 09	18.4	23.8	85.7	23.6	24.2	24.7
TOTAL ...	4633.8	—	—	—	—	—	—	—

7.11.5 The total weight of green leaves harvested was 196,067.5 Kg.

7.11.6 Table 7.24 (Yield of green leaves (1975-1980).

7.11.7 The average yield of green leaves/arpent was 2,854 Kg.

TABLE 7.24

YIELD OF GREEN LEAVES (KG.) FOR 1975–1980

Year	1975		1976		1977		1978		1979		1980	
Month	Yield	% Total	Yield	% Total	Yield	% Total	Yield	% Total	Yield	% Total	Yield	% Total
January	45,398.5	21.37	40,181.5	13.73	44,630	14.73	44,990	16.14	38,854	15.47	22,427.5	11.44
February	10,287.5	4.84	27,950	9.55	35,930	11.86	41,220	14.79	17,730	7.07	23,442	11.96
March	33,912	15.96	46,310	15.82	51,660	17.05	34,330	12.32	45,900	18.30	18,728	9.55
April	23,501	11.06	35,570	12.15	36,890	12.17	27,650	9.92	27,381	10.92	31,452	16.09
May	24,269	11.42	23,920	8.17	27,720	9.15	26,680	9.57	20,036	7.99	11,502	5.86
June	9,412	4.43	15,440	5.27	10,960	3.61	4,750	1.70	8,208	3.27	6,607	3.37
July	2,727.5	1.30	6,040	2.06	3,610	1.19	—	—	1,258	0.50	3,621	1.84
August	2,301	1.08	2,626	0.89	—	—	6,369	2.28	—	—	1,364	0.69
September	2,060	0.96	5,970	2.04	5,730	1.89	18,134	6.50	16,260	6.48	5,238	2.67
October	24.450	6.80	19,880	6.79	20,120	6.64	14,478	5.19	24,220	9.66	19,379	9.88
November	19,100	8.99	28,600	9.77	26,370	8.70	29,208	10.48	25,973.5	10.36	20,197	10.30
December	24,943	11.74	40,150	13.72	39,300	12.97	30,879	11.08	24,977.5	9.96	32,020	16.33
TOTAL ...	212,406		292,637.5		302,920		278,688		250,798		196,067.5	

TABLE 7.25

7.11.8 AVERAGE YIELD KG/HECTARE 1975 — 1980

1975	...	...	7,612.5
1976	...	...	10,760
1977	...	...	11,137.5
1978	...	...	10,245
1979	...	...	9,220
1980	...	...	7,135

7.11.9 *Seeds Gardens*

The seeds from 70 selected plants at De Rauville will be collected for experimental purposes.

7.11.10 *Experiments*

The following experiments were carried out on the station during the year:—

(1) Biological and ecomical optimal rate of Nitrogen application at two levels of phosphate and potash.

(2) Effect of time and frequency of application of phosphate and potash on the yield of tea, the Nitrogen rate remaining constant.

(3) Optimum time of prune.

(4) Effect of different rates of Nitrogen application at different levels of phosphate and potash.

(5) Clonal Selection.

7.11.11 *Disposal of produce*

196,067.5 Kg of green leaves were sent to Corson Tea Factory. 35,600 potted VP1H plants were issued to the Tea Development Authority free of charge.

TABLE 7.26

FIELD MANAGEMENT

Field No.	*Acreage (in Arp.)*	*1978*	*1979*	*1980*
1 ...	3.05	Prune	Light skiff	Light skiff
2 ...	3.98	Prune	Light skiff	Light skiff
3 ...	2.86	Unprune	Deep skiff	Unprune
4 ...	4.73	Deep skiff	Prune	Unprune
5 ...	2.40	Prune	Unprune	Deep skiff
6 ...	3.32	Prune	Unprune	Deep skiff
7 ...	3.96	Unprune	Deep skiff	Prune
8 ...	5.26	Unprune	Deep skiff	Prune
9 ...	3.29	Unprune	Deep skiff	Prune
10 ...	2.43	Unprune	Deep skiff	Prune
11 ...	2.44	Unprune	Deep skiff	Prune
12 ...	3.87	Light skiff	Prune	Unprune
13 ...	1.92	Prune	Unprune	Light skiff
14 ...	4.93	Unprune	Deep skiff	Prune
15 ...	3.26	Unprune	Deep skiff	Prune
16 ...	3.59	Prune	Unprune	Deep skiff
17 ...	3.40	Prune	Unprune	Deep skiff
18 ...	2.69	Prune	Unprune	Light skiff
19 ...	2.63	Prune	Unprune	Light skiff
20 ...	3.87	Light skiff	Prune	Unprune

7.12 *Belle Vue Station*

OFFICER IN CHARGE: SENIOR TECHNICAL OFFICER F. LAM KEE

7.12.1 *General*

The station is situated in the west part of the island and is 90 feet (27.4 metres) above sea level, it became functional as from early 1970. The farm has an area of 15 arpents 23 perches (6.4 hectares) and includes buildings, farm roads, rock piles, irrigation and drainage systems. The cultivable area is 9 arpents (3.6 hectares).

The texture of the soil is strong clay with low permeability. The PH value of the soil is 7.2 and consequently close to the optimum PH value 6.5 for rice cultivation.

The mean air temperature is 25°C (range 21.8°C to 27.7°C) and the average annual rainfall is 987.0 mm.

The farm is mainly devoted to rice experiments with the objective of increasing rice production through the introduction of better rice varieties and cultural methods.

7.12.2 *Weather conditions*

Rainfall, registered for the year, was 1,264.0 mm. or 49.76 inches, which was 277.0 mm. above the average annual rainfall of 987.0 mm. Because of cyclonic conditions, January was exceptionally wet with a precipitation of 769.8 mm.

7.12.3 Approximately 60% of the cultivable areas was sown under rice. 20% was planted under citrus and mango trees and the remainder was planted under sugar-cane and vegetables. All sugar canes were uprooted as from July 1980 and planted under sweet potatoes and green beans.

7.12.4 The following were grown during the year :—

Rice, green beans, chinese cowpeas, bitter gourd, wax gourd, sponge gourd, cucumber, water melon, squash, sweet potatoes, straw mushrooms, groundnuts and tomatoes.

The incidence of leaf miners was high on some vegetable crops, despite the use of insecticides.

Because of the reluctance of labourers to work in paddy fields and also to reduce costs, rice was either sown directly in the fields with the mechanical seeder or else was hand broadcasted. Thus there was no need of nursery and there was no transplanting. The slight decrease in yield was compensated by the significant reduction in costs.

7.12.5 During the year, the existing citrus orchard was extended and 40 frost eureka lemon layers were planted.

7.12.6 *Disposal of Produce*

To Barkly Experiment Station—5,333.0 kilos of paddy for seed.

To Livestock Feed Factory, 30,844.0 kilos of paddy for milling purposes. The polished rice would be disposed of through the Ministry of Supplies.

7.12.7 *Sales*

Sweet potatoes (1,040.5 Kgs), tomatoes (1,371.0 Kgs), Cucumber (1,165 units), Wax gourd (1,826.0 Kgs), Cowpea (214.5 Kgs), Bitter gourd (114.25 Kgs), Sponge gourd (271.5 Kgs), Green beans (69.5 Kgs), Groundnuts (59.0 Kgs), Water melon (133.0 Kgs), Mangoes (69.5 Kgs), Lemons (254.0 Kgs) and oranges (461.0 Kgs).

Total revenue collected for the year was Rs 10,149.08

Total revenue collected for the selling of fruits was Rs 4,098.50

Total revenue collected for the selling of vegetables was Rs 5,950.58

Token fee for use of tractor and implements Rs 100.00

7.12.8 *Visits*

The station was visited by the Chinese Vice Prime Minister Mr. Ji Peng Fei on the 5th September.

There were also visits made by members of various agricultural youth clubs, colleges, visitors from Reunion Island and members of the public.

7.12.9. *Weather records*

TABLE 7.27

METEOROLOGICAL DATA

Month	*Rainfall*	*Mean monthly maximum temperature*	*Mean monthly Minimum temperature*	*Mean monthly relative humidity*
January ...	769.8 mm	29.7°C	23.7°C	84.7%
February ...	66.2 mm	29.8°C	23.0°C	67.8%
March ...	237.5 mm	29.7°C	23.8°C	81.0%
April ...	86.3 mm	28.5°C	20.8°C	73.0%
May ...	28.3 mm	27.5°C	19.2°C	68.2%
June ...	18.7 mm	26.8°C	17.5°C	67.3%
July ...	5.8 mm	26.0°C	16.7°C	68.0%
August ...	2.0 mm	25.4°C	16.3°C	67.0%
September ...	7.9 mm	26.3°C	17.6°C	68.1%
October ...	26.4 mm	27.4°C	20.0°C	62.5%
November ...	1.2 mm	28.8°C	21.0°C	76.2%
December ...	13.9 mm	30.1°C	21.0°C	64.0%

BELLE VUE STATION

CHINESE AGRICULTURAL TECHNICAL TEAM

7.13 (Period covering the first half of 1980)

7.13.1. A. *Rice*

According to the principles, agreed by both the Chinese and Mauritian sides, the rice cultivation in Belle Vue sub-station would be taken over by the Mauritian side, whereas the Chinese side would act as adviser as from January 1980. Because of constraints such as cyclones and rains, the sheduled direct-sowing of paddy in rows by machine under dry-land condition had to be done by hand-broadcasting under wet-land condition. The total area under rice cultivation during this crop in the station was 6.126 arpents. A total of 13,647 kgs of winnowed paddy (to be sent to Richelieu for drying) has been obtained, averaging 2,227 kg per arpent. This represents a drastic fall in paddy yield per unit area compared with those of corresponding periods in previous years. Such fall is mainly caused by:

1. *Excessive rainfall*

   From post-sowing till pre-harvest the paddy had been hit by three or four cyclonic storms and continous heavy rains. The land preparation by tractor was rough prior to sowing, and this reduced germination of seeds considerably. Though recruiting was done, the number of available panicles was affected.

2. *Bird damage*

After heading and milking stages, heavy bird damage took place due to lack of birdscarers or improper birdscaring later.

3. *Rough harvesting and sundrying operations*

Most of the labourers involved in the harvest of this crop were freshly transferred from Tea Development Authority. They were new and not experienced in harvesting, thrashing, winnowing and sun-drying of paddy.

4. *Delay in sowing*

In addition, the sowing time was delayed for almost one month and the harvest time was delayed about half a month compared with previous corresponding periods. Cyclonic rains also reduced the yield of the crop.

7.13.2 Chemical weeding trials using herbicides Ronstar and Preforan were carried out from February to June 1980 using different concentrations, different number of applications and different periods of applications in several paddy fields where seeds were sown directly by hand-broadcast. Details of trials in fields I-6 and II-6 are given below.

FIELD I — 6

1. *Treatment* — Seven

A. Ronstar 0.2cc/M², Preforan 0.3cc/M²
B. Ronstar 0.4cc/M², Preforan 0.3cc/M²
C. Ronstar 0.6cc/M², Preforan 0.3cc/M²
D. Ronstar 0.5cc/M², Preforan 0.4cc/M²
E. Ronstar 0.5cc/M², Preforan 0.6cc/M²
F. Ronstar 0.5cc/M², Preforan 0.8cc/M²
G. Control

These sprayings were applied to all the treatments except the control.

First spraying (Ronstar): four days after sowing
Second and third sprayings (Preforan): at 3rd-leaf stage and 8th-leaf stage respectively.

2. *Design*

There were 7 treatments, 3 replicates and 21 plots under randomisation, with an acreage of 20 M² for each plot.

3. *Field operation*

Sowing was performed on February 19th and harvest on June 23rd. Variety used was Kwang Er I 5-3.

Fertilization and field management were similar to those in the production fields.

B. *Results*

TABLE 7.28

Treatment	After first spraying		After third spraying	
	weeds/m²	Compared to control ± %	weeds/m²	Compared to control ± %
A ...	0.67	— 98.62	1.67	— 98.12
B ...	0.67	— 98.62	0	—100
C ...	0.67	— 98.62	0	—100
D ...	0	—100.00	0	—100
E ...	0.33	— 99.32	0	—100
F ...	0	—100.00	0	—100
G ...	48.66		89.00	

2. *Paddy yield*

TABLE 7.29

Treatment	Yield in blocks (kg)			Total	mean	Compared to control ± %
	I	II	III			
A ...	13.5	12.4	15.2	41.1	13.70	+22.41
B ...	15.0	14.0	17.0	46.0	15.33	+30.46
C ...	12.0	14.5	12.5	39.0	13.00	+18.00
D ...	10.0	14.0	14.5	38.5	12.83	+16.91
E ...	16.8	13.5	12.5	42.8	14.26	+25.25
F ...	11.0	13.5	14.2	38.7	12.90	+17.36
G ...	6.5	14.0	11.5	32.0	10.66	

3. *Analysis of variance*

From statistical analysis, yield differences among treatments did not reach significant level.

TABLE 7.30

Treatment Code	Yield (kg/plot	Difference					
B ...	15.33	—	—	—	—	—	—
E ...	14.26	1.07	—	—	—	—	—
A ...	13.70	1.63	0.56	—	—	—	—
C ...	13.00	2.33	1.26	0.70	—	—	—
F ...	12.90	2.43	1.36	0.80	0.1	—	—
D ...	12.83	2.50*	1.43	0.87	0.17	0.07	—
G ...	10.66	4.67**	3.60**	3.04*	2.34	2.24	2.17

L.S.D. 5% = 2.44; L.S.D. 1% = 3.42

4. *Discussion*

(a) The number of weeds remaining in plots after chemical treatments were 98.12 to 100% lower than those in control plots, and the yields were 16.91 to 30.46% higher than those in control plots. Therefore, successful weed control can be achieved by applying Ronstar and Preforan at concentrations of 0.2cc/M^2 and 0.3cc/M^2 respectively four days after sowing and at the 3rd-leaf stage accordingly.

(b) Due to slightly uneven land preparation by tractor before sowing, seed germination was irregular. Though recruiting was done, the number of available panicles was affected at harvest time.

FIELD II — 6

1. *Treatment* — four

(a) 2applications of herbicides by spraying on the 4th day after sowing and the third -leaf stage respectively.

(b) 3 applications of herbicides by spraying on the 4th day after sowing, the 3rd and 7th leaf stages respectively.

(c) 4 applications of herbicides by spraying on the 4th day after sowing, the 3rd, 7th and 10th leaf stages respectively.

(d) Control

Ronstar at 0.5cc/M^2 was used in the first spraying to all the above treatments expected. From the second and subsequent spraying, Preforan at 0.5cc/M^2 was used in the treatments accordingly.

2. *Design*

There were 4 treatments and 3 replicates totalling 12 plots under randomisation, with an area of 36.36m^2 for each plot.

TABLE 7.31

	After 1st spraying		*After 4ih spraying*	
Treatment	*Weeds/M^2*	*Compared to control ± %*	*Weeds/M^2*	*Compared to control ± %*
A ...	0	— 100	0	— 100
B ...	0	— 100	0	— 100
C ...	0.33	— 98.23	0	— 100
D (control) ...	18.66		12.0	

2. *Paddy yield*

TABLE 7.32

	Yield in blocks (kg)					
Treatment	*I*	*II*	*III*	*Total (kg)*	*Mean (kg)*	*Compared to control ± %*
A ...	20.5	21.5	24.5	66.5	22.17	+ 8.29
B ...	23.0	22.5	22.5	68.0	22.67	+10.32
C ...	19.5	16.5	14.5	50.5	16.83	−20.79
D (control) ...	19.5	19.0	22.5	61.0	20.33	

3. *Analysis of variance*

The paddy yield differences were significant among the treatments.

TABLE 7.33

Treatment Code	*Yield (kg/plot)*	*Difference (kg/ploi)*		
B	... 22.67			
A	... 22.17	0.50		
D	... 20.33	2.34	1.80	
C	... 16.83	5.84*	5.34*	3.5

L.S.D. 5% = 4.16

L.S.D. 1% = 6.31

4. *Discussion*

(a) The yield difference from the treatments in this trial reached the significant level.

(b) In treatment C, the paddy leaf-blades were partially burned seriously after being sprayed with Preforan 0.5 cc/m² on the 10th-leaf stage, bringing a loss in yield.

(c) Effecetive weed control can be obtained, when Ronstar 0.5 cc/m² and Preforan 0.5 cc/m² are applied to paddy fields on the 4th day after sowing and on the 3rd leaf-stage respectively. It seems unnecessary to spray herbicides on the seventh-leaf and tenth-leaf stages.

(d) Due to slightly uneven land preparation by tractors before sowing, the seed germination was not full. Though recruiting was done, the number of available panicles at harvest time was reduced considerably.

7.13.3. *Vegetables*

From January to March, Mauritius was hit by cyclones and continuous rains. The cropping season of vegetables had to be delayed once and again. Two batches of vegetable seedlings were propagated in soil blocks, but due to the impossibility of machine land preparation in the scheduled vegetable field, the planting time was missed repeatedly. Finally, manual labour had to be used for bedding. Planting of all the gourds and beans was completed by the 1st April. In this first half of the year, we mainly practised the following measures in the management of vegetable cultivation.

(a) Huge and broad beds and deep ditches were adopted to facilitate irrigation and drainage in the vegetable field.

(b) The sowing was put off one month later than usual. After planting, temperature went down gradually and the dry wind season came, thus causing certain adversity to the good development of the cucurbits and beans, particularly adverse to the flowering and fruit-setting. In order to promote a quick growth and fast development, extra amounts of fertilizers were applied. So, in addition to sufficient basal dressing (equivalent to 12,700 kgs of cow manure per arpent), extra amount of organic manure (equivalent to 2,472 kgs of cow manure per arpent and 2,472 kgs of poultry manure per arpent) was added onto the beds' surface to encourage strong root system, to maintain a vigorous growth of the aerial parts and to promote the florescence and fruit-setting.

(c) Artificial pollination was conducted to some huge-size cucurbits such as Chieh Guah Wax Gourd and Wax Gourd. One to two times of artificial pollination were done within one or two days after flowering, best time for such operations was about 8 a.m. All the male flowers were removed after the pollination so as to cumulate more nutrients within the plants for good fruit-setting and their quick growth. Yield details are listed in table 7.34

Five tomato varieties, introduced from China, have been released from Réduit Quarantine House after undergoing quarantine. Now, adequate seeds are available through quick propagation, and are ready to undergo cultivation trial at stations in Belle Vue, Barkly, Pamplemousses as well as in the demonstration centres of Flacq and Rivière des Anguilles in the next half of 1980 according to schedule.

In line with the principles recently agreed upon by the two sides, besides running the experimentation in Belle Vue Station, the Chinese vegetable varieties and their cultural techniques will be extended to several major Experiment Stations and Demonstrations Centres. Up to now, purification and rejuvenation of vegetable seeds have been carried out on yard-long bean, cucumber, sponge gourd, bitter gourd, wax gourd, Chieh Guah Wax gourd and tomatoes, and sufficient seeds of the germplasm have been selected and stored.

As to straw mushroom cultivation, the paddy straw got rotten and became useless due to cyclones. Now, more attention is given to the preservation of the spawns of straw mushroom.

PLANTATION AND HARVEST OF CUCURBITS AND BEANS IN THE FIRST HALF OF 1980

BELLE VUE STATION

Variety	*Area under cultivation (Arpent*	*Spacing (cm×cm)*	*Whole Growth Cycle (days)*	*No.of Plants*	*No. of Fruits*	*Total Weight (0.5 kg)*	*Mean Yield per plant (0.5 kg)*	*Yield per arp. (kg)*
Yard Long Bean (Green Variety)	0.016	10×177	110	161	—	210.6	1.3	6,798.4
Cucumber	0.016	12.5×188	99	230	765	825.8	3.59	24,853.6
Chieh Guah Wax Gourd	0.019	35×197	106	103	606.0	930.4	9.0	26,528.7
Wax Gourd	0.016	45×185 (2 plants/hole)	113	82	82	1,200.0	14.63	36,171.2
Sponge Gourd	0.034	30×195	110	255	915	985.8	3.86	14,292.0
Bitter Gourd (Hainan Variety)	0.008	30×192	86	61	209	86.0	1.5	5,040.2
Bitter Gourd (Halei Variety)	0.004	30×192	86	34	49	31.5	0.90	3,692.3
Bitter Gourd (Gaileung Variety)	0.040	30×192	86	377	811	385.1	1.01	4,779.8

7.13.4. *Citrus*

Following the severe Cyclone " Claudette " at the end of December last, the citrus orchard in Belle Vue station was again hit by cyclone early this year. Meanwhile, the orchard also suffered from the influences of consecutive rains brought about by the uncommon adverse weather conditions from January to March. Consequently, three kinds of diseases broke out and affected the trees :

1. Green Mould of Citrus (*Penicillium digitatum* Sacc.) heavily destroyed the fruits : fruit rot and fruit-shattering, caused by green mould, started as from last December. From investigation, the number of fruits rotten and shattered was up to 80% of the total.

2. Canker of Citrus (*Xanthomonas citri*) greatly spread throughout the orchard, injuring the leaves and some fruits. In the past four years, there was only one lemon tree in first section of the orchard being infected by canker with leaves and fruits injured. But since this year, canker has spread on leaves in the whole orchard. Some of the fruits were injured and shattered.

3. Gumming Disease (*Phytophthora* sp.). Following one or two years after the plantation of the trees, gumming was observed on a few tree trunks. This disease became more virulent this year. There were 72 plants infected to various extents (up to 22% of the total number of plants) in the whole orchards.

Taking the above facts into consideration, greater efforts have been spent to strengthen the post-calamity management in the 1st half of this year in order to accelerate the recovery of tree vigour and lay a good foundation for the next bearing year. These measures adopted are :

1. Following every cyclone or heavy rain, the first opportunity was seized to erect the blown-down trees, support the suspending branches due to heavy-bearing, clear away the rotten fruits, drain away the stagnant water, spray fungicides to control diseases in order to protect the new sprouts and paste the trees' trunks with fungicides to control gumming disease.

2. Strengthening of the management of fertilization, water and the improvement of soil. Since February this year, four applications of compound fertilizer have been carried out, with half kg for each tree in each application. The applications of fertilizers followed operations of weeding and soil loosening. For purpose of promoting healthy new sprouts and creating favourable conditions for blooming in August and September, the soil was turned deeply and an application of manure and fertilizer was carried out during May and June. The operation is as follows :

(a) Pits of 30 cm (deep) ×40 cm (wide) × 50 cm (long) were opened up between the rows.

(b) 25 kgs of cow manure and 0.5 kg of compound fertilizer were applied to each pit.

(c) After covering with earth, thorough mixing operation was carried out once, followed by mulching with paddy straw on the soil surface of the orchard.

3. Pruning and trimming: after fruit harvest, pruning was done to shape the tree' crowns. Some tumorous, withered, suspended branches as well as those inflorescences, coming out during May to July, were all removed. Seven trees seriously affected by gumming were removed and replaced by new grafts; those trees with weak growth vigour were given extra amount of fertilizer and manure so as to activate their development. Owing to the dry season, particular attention was also given to water management.

For a better look of the orchard, a piece of waste land was exploited to plant lemon trees. Layering operation started in mid-March and fifty-two layers were planted in the beginning of June. Specification of hole is :

40-50 cm (deep) $\times$100 cm (long) $\times$ 100 cm (wide)

10 kgs of paddy straw and 30 kgs of cow manure were buried at the bottom of each hole. Spacing is : 2.5 m $\times$ 3.5 m.

First fertilization started 40 days after the plantation, each tree received 100 grams of ammonium sulphate. Then at every 15 days' interval, three applications of compound fertilizer at the rate of 150 grams per tree per application were conducted. Now the trees are showing vigorous growth with strong sprouts, coming out in quite large numbers.

7.13.5 Besides, meetings were held on the extension work in late May according to the suggestion of Honourable the Minister of Agriculture and Natural Resources and the Environment. Both parties came to realise that it was time to extend the results and varieties obtained in Belle Vue Station to the farmers in the light of experiments and trial productions, conducted over the past five years. And it was agreed that the forthcoming extension work would be directed by the Mauritian side and advised by the Chinese side. The experimental stations at Barkly and Pamplemousses and the two demonstration centres at Flacq and Rivière des Anguilles were chosen for demonstrations, using Chinese varieties and cultural techniques. At the above-mentioned two Experiment Stations, two pieces of land, each covering about $\frac{1}{6}$ arpent would be alloted as demonstration plots, where those vegetable varieties of sponge gourd, bitter gourd, cucumber, wax gourd and yard-long beans and tomatoes introduced from China would be planted. Another two pieces of land, each measuring about $\frac{1}{6}$ to $\frac{1}{3}$ arpent would be alloted for the purpose of setting up two citrus orchards, planted mainly to the two citrus varieties of Golden Seal orange and Eureka lemon for demonstration, displaying the main feature of close spacing horticultural techniques and aiming at early fruit-bearing and high-yielding. At the two Demonstration Centres, two small plots of land would be devoted to planting the above-mentioned vegetable varieties for the purpose of demonstration of the Chinese cultural techniques to the private farmers.

7.13.6 (Period covering the 2nd half of 1980)

7.13.7 *Paddy*

According to statistics from Belle Vue station, a total acreage of 5.7 arpents of paddy was cultivated in the second crop (2nd half of 1980), bringing a total harvest of 17,791 kg (paddy) with a mean yield of 3.1 tons per arpent. Variety under cultivation was all Kwang Er I 5—3. Due to rainy weather during May and June, nearly $\frac{2}{3}$ of the paddy fields had to be sown under flooded conditions and only $\frac{1}{3}$ of the paddy fields were sown by seeding machine under upland condition. The total area, sown with the sower, was 2.32 arpents, with an average paddy yield of 3.216 tons per arpent, the highest yield being 4.003 tons per arpent; the total area sown by hand-broadcasting was 3.38 arpents with a mean yield of3.056 tons per arpent. Yield results show that those paddy fields, sown by seeding machine, gave a higher yield, the main reason being that, during the germination period, the bird damage happened to be quite light and the number of seedlings as well as the number of available panicles were higher.

The yield of this crop was lower than those of the corresponding periods of past years; the main possible reasons being:—

(a) The surface of the fields after ploughing and harrowing was not level. Such problem appeared in the fields either sown by hand or by seeding machine. Owing to the uneven land preparation, bird damage was serious and weeds grew profusely on the higher parts, while on the lower parts, germination was rather poor due to water-logging and eventually the uniform growth of paddy in the whole field was affected.

(b) The initial number of seedlings after sowing and the number of available panicles at harvest were fewer than those in previous years.

(c) Harvest and sundrying operations were handled roughly due to lack of experience of the labourers, participating in the harvest. Consequently, loss or waste of paddy was considerable.

7.13.8 *Vegetables*

As far as the vegetable production in Belle Vue station is concerned, the varieties of tomatoes, cucurbits and pulse were sown on July 2nd and July 30th respectively after completion of the pre-cultivation preparations.

After sowing, recruiting of seedlings, watering, application of fertilizer and chemical sprayings were done in time in order to ensure full germination and later to promote sound growth of the plants.

Bitter gourd had low yields as a result of the delayed removal of sideshoots. The ditches around the mounds being rather shallow, the growth of root system being not deep enough and also the serious infestation of powdery mildew during the flowering and fruiting stage. Owing to lack of bamboo sticks, the trellis made for sponge gourd had to be in single

herring-bone shape, thus reducing the available space of trellis by half and producing a dense growth of stems and leaves which influenced the potential of fruiting and eventually lowered the yield as compared to that of the corresponding period in previous years. The varieties of wax gourd, Chieh Guah wax gourd, cucumber and cowpea got higher or equal yields compared to those of the corresponding periods of previous years. In addition, certain amounts of seeds of various varieties were kept for other stations.

The growth of tomato was good, for the yield was not low. From the results of this crop's cultivation, the yields of both Apple Green No. 2 and Zhujianghung varieties were rather high, showing the advantages of large fruit size, red colour, thickflesh and no cracked fruits. The yield of Kapok No. 2 variety was slightly low, but this variety has the advantages of nice fruit shape, red colour, tough flesh, fine taste and no cracked fruits. Furthermore, this variety is accepted by the public.

The cultivation of straw mushroom was conducted for the purpose of preserving strains. Every 100 kgs of straw produced four to five kgs of fresh straw mushrooms. The yield was lower than usual.

Details of the yields of various crops produced in the 2nd half of 1980 are listed below.

TABLE 7.35

Description	*Date sown*	*Days lasted*	*Area planted (Arp.)*	*Actual Yield collected (pound)*	*Yield per arpent*
Zhujianghung	80.7.2	119	0.105	520.0	17.33
Apple Green No. 1 ...	80.7.2	119	0.035	1127.0	16.10
Apple Green No. 2 ...	80.7.2	119	0.033	1399.2	21.20
Kapok No. 2	80.7.2	119	0.033	760.0	11.52
Kapok No. 3	80.7.2	119	0.031	600.8	9.69
(above are all tomatoes)					
Wax Gourd (Green skin) ...	80.7.30	158	0.017	2016.0	59.29
Wax Gourd (Chieh Guah) ...	80.7.30	158	0.017	1483.0	43.61
Sponge Gourd ...	80.7.30	152	0.035	911.0	13.03
Bitter Gourd (Gaileung) ...	80.7.30	126	0.035	327.0	4.67
Cucumber	80.7.30	138	0.037	2484.9	33.89
Cowpea (Green variety) ...	80.7.30	142	0.036	802.0	11.14

7.13.9 *Citrus*

July is the right time for the sprouting of fruit spurs. In order to promote flowering and uniform sprouting, application of cow manure and compound fertilizer was carried out throughout the orchard in early July. Pits were opened between rows and 0.5 kg of compound fertilizer as well as 15 kgs of composted cow manure were applied to each tree. One application of top-dressing using compound fertilizer (0.5 kg/plant) was undertaken from September to November, aiming at accelerating new sprouts to grow and the formation of young fruits.

Inflorescences which bloomed in July, were all plucked off. Ballform flowers which bloomed in August, were removed as well during the initial flowering stage, in order to keep more single terminal flowers, maintaining a bearing balance of fruits on the trees and raising the rate of fruit setting.

To prevent water-logging, three new drainage ditches were dug out in August with a total length of 30 metres. Ditches around the orchard were deepened and weeding was carried out in the orchard monthly in order to maintain a tidy look.

Some weak-growing trees, affected by gummosis, were replaced by 16 orange trees of Golden Seal variety from August to November. In addition, 38 lemon layers were planted. These are now sprouting and growing normally.

7.13.10 *Vegetables*

The vegetable varieties of sponge gourd, bitter gourd, Chief Guah Wax gourd and cowpea, introduced from China, and later cultivated in Belle Vue Station, were planted for demonstration purposes in stations at Barkly, Pamplemousses and demonstration centres at Flacq and Rivière des Anguilles as from the second half of 1980. Meanwhile, some tomato varieties newly introduced from China, were also cultivated in the stations at Barkly and Pamplemousses.

Through close co-operation the Mauritian and Chinese sides, good harvests have been obtained in the stations and centres with the exception of the Rivière des Anguilles Demonstration Centre.

From the results obtained at various stations, the performances of Chieh Guah wax gourd and bitter gourd were satisfactory. Specially, the Chieh Guah wax has shown good adaptability together with the advantages of a prolonged harvesting period and high-yields. The growth of sponge gourd, cucumber and cowpea were normal and their yields were good. The plantation of tomatoes at Barkly was quite successful, fruiting being abundant, harvest period long and the yield high. But in contrast with these results at Pamplemousses, the yield of tomato fruits was low due to bacterial wilt.

In the process of this crop's cultivation, two noticeable problems came to light.

(a) too-early sowing time:

Tomatoes were sown in late June and transplanted in mid July, while the crops of cucurbits and pulse were sown in late July. The effecs of low temperature and dry wind after sowing were rather serious for these varieties, particularly with the plantation at Pamplemousses. Therefore, for the forthcoming crops, it is proper to postpone the sowing period until mid or late August, with special attention being given to the sowing time of cucurbits and pulse.

(b) incomplete seed germination:

After sowing, the seedling growth was influenced by low temperature and dry wind as well as improper water management and also bird damage. So seedling vacancy was common. Though several recruitings were made, the yield was affected considerably. In future, if the acreage of plantation is not large, it isbetter to change directs sowing to seedling production in soil blocks. The water management and prevention of bird damage can be controlled after seeds are directly sown in order to have full germination and strong seedlings.

7.13.11 *Citrus Orchards*

New citrus orchards were set up at Pamplemousses E.S., Barkly E.S. as well as le Reduit Ground n the 2nd half of 1980. Grafting of root stocks began in early August, with a total of 346 graftings of Golden Seal orange and Eureka lemon. Single bud grafting technique was the main method used. The survival rate was over 90%. Thorough preparations were made before the setting-up of the orchards: pits of $1m^3$ each were opened and various lavers of weeds, thrash and cow manure were dumped into the pits. As a precauton to avoid excessive sinking of top layer soil, mounds of 40 cm high were made before the transplanting was carried out during November and December. There were 99 plants of Golden Seal orange and 47 plants of Eureka lemon, planted in Pamplemousses; 69 plants of Golden Seal orange and 30 plants of Eureka lemon, planted in Barkly and a total of 26 plants of Golden Seal orange and Eureka lemon planted in Le Reduit Ground. Forty days after planting, top-dressing of compound fertilizer was applied and the trees are now sprouting and growing healthily.

7.13.12 Control was also effected as regards several important insects and diseases in some agricultural crops.

7.13.13 *Vegetables*

7.13.13.1 During the cultivation of sponge gourd, bitter gourd, Chieh Guah wax gourd, wax gourd, cucumber, cowpea and tomatoes, introduced from China, in the stations of Belle Vue, Barkly, Pamplemousses, Reduit Ground and Demonstration Centres of Flacq and Rivière des Anguilles, there occurred four kinds of insects namely leaf-miner, fruit-fly, aphids, and red mites and five diseases:—powdery mildew, downy mildew of cucurbits, late

blight, leaf-mould and bacterial wilt of tomato. Efforts have been mainly directed on the control of leaf-miner, powdery mildew on cucurbits, late blight and leafmould of tomato as well as fruit-fly, aphids and red mites. Below is an indication of their occurrence and the control measures taken:—

7.13.13.2 *Leaf-miner*

It is a destructive insect brought into Mauritius in recent years, having a great variety of vegetables and wild plants as hosts among which cowpea, sponge gourd, wax gourd, Chieh Guah wax gourd and tomatoes suffer more seriously. According to observations in Belle Vue station in 1980, 21 generations were recorded in the fields throughout the whole year. The different stages of one life cycle shortened as temperature went up, larval stage being 4 - 7days and pupal stage 6 - 12 days. Though the generations overlapped, there were obvious peak periods of occurrence in the fields. The pupation of larvae and the emergence of adults mostly took place in mornings from 8 - 13 a.m. When larvae began to pupate, they crept out of their tunnels and rolled down into the earth from the leaves after their pupation. To control it, regular sprays once every 5 - 7 days and some extra sprayings to kill adults and newly-hatched larvae, especially, at the peak emergence period of adults and the hatching period af larvae were effected in the fields. It is advisable to spray once every 4 - 5 days the cowpea plots, attacked by leaf miners, before pod formation. The insecticides recommended are Decis, Folimat, Azodrin, Lebaycid, etc. However Decis seems to be more effective.

7.13.13.3 *Fruit-fly*

It spoils young fruits of cucurbits in fruiting stage. Bitter gourd, sponge gourd and cucumber are more susceptible. According to observation in Belle Vue station, before its pupation, most of the larvae wormed out of the spoiled fruits and fell on the earth for pupation which lasted 8 - 10 days. There were evident peak periods of injury in the fields. To control this insect, insecticides of short residual duration such as Gardona were used. Meanwhile, the injured fruits in the fields were collected and destroyed before the insect's pupation to bring the insect population under control, thus bringing its damage to cucurbits to a minimum.

7.13.13.4 *Powdery mildew*

The crops of cucumber and bitter gourd were affected more seriously by this disease while the varieties of sponge gourd, Chieh Guah wax gourd and wax gourd had certain resistance to it. Isolated cases of its occurrence were recorded in the seedling stage and widespread outbreak of this disease took place after entering the fruiting stage when there was a drought. During the cool season from June - October, this disease may occur severely, provided there was plenty of dew over-night. The disease would spread rapidly where ventilation was poor. In fields, where drainage was improper and the growth of plants were weak due to malnutrition (especially during the fruiting stage), the disease was quite serious. It is possible to control the disease by applying fungicides such as Karathane and Topsin right at the initial stage of infection.

7.13.13.5 *Late blight of tomatoes*

Rare evidence of this disease was recorded in the plantation of tomatoes in Belle Vue station. However, in early September, the tomato plantation of "Apple Green" variety at Barkly station was infected with this disease due to the over growing of the plants and frequent rainy weather. Fungicides such as M-45, Faycozeb were sprayed once a week after its occurrence. It was soon brought under control, thus ensuring a rather good harvest.

7.13.13.6 *Leafmould of tomatoes*

In early August, the disease appeared in Belle Vue Station and later, it developped quite rapidly in the middle and last stages of fruiting, resulting in early withering of leaves. It was noticed that the Apple Green variety was quite tolerant to the disease, while other varieties were quite susceptible to it. It is useful to control the spreading of this disease by spraying M-45 at the initial stage of its occurrence and subsequent fungicide application once every 7-10 days.

7.13.14 *Citrus*

7.13.14.1 More disease were recorded in the Belle Vue citrus orchard as a result of cyclones in early 1980. Therefore, in the 2nd half of the 1980 crop, protection measures were taken to safeguard new sprouts, normal inflorescences as well as fruits and to recover the growing vigour of the disease-infected trees, while citrus canker, gummosis and red mites were considered as the main pests requiring control. Aphid was also controlled concurrently.

7.13.14.2 *Citrus canker*

After cyclones in 1980, this disease was common in Belle Vue citrus orchard. The rate of infected leaves was 20-50% and finally, it went up to 90%. So the control of citrus canker in the second half of 1980 was undertaken with the use of fungicide treatments, supplemented by the removal of infected leaves by hand, in order to reduce the source of this bacteria. At the primary stage of every sprout (when the length of each sprout was below 5 cm), opportunity was seized to spray M-45 at 2gm per litre, as a result, the control effect was very remarkable and the rate of infected leaves in the orchard fell below 8%.

7.13.14.3 *Gummosis of citrus*

153 citrus trees which accounted to 48% of the total number, were affected by gummosis, when the disease spread throughout the orchard after the cyclones. An observation trial on control effect started in mid April by means of scraping off the infected parts (a part of the healthy tissue must also be scraped away) and then applying fungicidal pastes on the cleaned exposed parts. Investigation on August 4th revealed that a certain amount of control was achieved, the effectiveness of Benlate, M-45, Topsin, Captan and M-45 Benlate mixed solution being 67%, 64%, 79%, 75%, and 69% respectively. In mid December, Ridomil was tried as treatment, and it proved to be very effective. A total of 34 plants were treated twice by this fungicide and the curing rate was 100%.

7.13.14.4 *Red mites*

The drought weather prevailing in the 2nd half of 1980 provided favourable conditions for the occurrence of red mites. Prior to citrus florescence and, particularly, from the initial fruit-bearing stage, Folimat, Azodrin, DDVP, Decis were used alternately or mixed together before application.

7.13.15 *Paddy and Sweet potato*

Crop protection in paddy fields was mainly centred on chemical weeding (Preforan 0.3cc/m^2 during the germination and the 2nd-3rd leaf periods respectively). During the middle and late growing periods, Furadan was applied to prevent the occurrence of rice borer. (90 days after sowing Furadan 0.9 to 1 gram/m^2 was hand-broadcasted).

The main insect pest, threatening sweet potato's growing, was leaf-folder. According to observation in Belle Vue station, the time of its pupal stage lasted 5 to 6 days. Control was effected at the time when the peak emergence of adults was just over and there were some newly-folded leaves (affected by freshly-hatched larvae), appearing in the fields. DDVP, Folimat, and Sevin were sprayed to protect the crop.

VIII. Division of Horticulture

HEAD OF DIVISION: I. RAJKOMAR, DIVISIONAL SCIENTIFIC OFFICER

8.1 The Division of Horticulture is responsible for the conduct of research of economic crops, the production and sales of plants and seeds, and for the management of a number of Experiment Stations and their nurseries and for the maintenance of the Royal Botanic Gardens, Pamplemousses.

In Collaboration with the University of Illinois, experimentation on soyabean is being conducted with a view to select suitable varieties in different geographical and climatic zones.

The seed production of groundnut was severely reduced as only 5.4 hectares were planted out of a projected acreage of 10.3 hectares. This was due to severe drought conditions prevailing in the second half of the year and hence no irrigation water was available.

The Quatre Bornes Demonstration Centre was closed on 1st September as sales of seeds and plants were negligible.

8.2 SCIENTIFIC OFFICER: K. F. LAN CHOW WING

8.2.1. OKRA (*Abelmoschus esculentus*)

EFFECT OF DIFFERENT PLANT DENSITIES AND SPLIT N APPLICATION ON CULTIVAR CLEMSON'S SPINELESS DURING THE WINTER SEASON

This experiment was conducted at Pamplemousses Experiment Station from the 10 April to the 28 July 1980. A split-plot design with 4 replications was used. The main-plot treatments were:—

N_1=one single side dressing of sulphate of ammonia at 120 kg N/ha applied 1 month after germination, in addition to a basal dose of 460 kg/ha 13: 13: 20: 2 compound fertilizer.

N_2=Two side dressings of sulphate of ammonia each at 60 kg N/ha respectively 1 and 2 months after germination, in addition to the basal fertilizer application.

The sub-plot treatments were 2×3 factorial combinations of the following.

S_1=Spacing of 90×30 cm

S_2=Spacing of 90×45 cm

P_1=1 plant per hill

P_2=2 plants per hill

P_3=3 plants per hill

Plot size was 5.4×4.5 m. The main results are given in table 8.1.

TABLE 8.1

MEAN YIELDS IN tons/ha

	S_1	S_2	M P
P_1 ...	4.46	3.04	3.75^{b}*
P_2 ...	6.68	4.32	5.50^{ab}
P_3 ...	8.26	6,20	7.23^{a}
Mean S ...	6.47^{a}*	4.25^{b}	—

* Means with the same letter are not significantly different at the 5% level.

The yield from the smaller spacing of 90×30 cm was significantly higher than from that of 90×45 cm. The highest yield was obtained from P_3 (three plants per hill). No significant difference was detected between N_1 and N_2. For winter growing of dwarf type of okra it is therefore recommended to to plant at high densities, these being achieved by using a spacing of 90×30 cm at 2 or 3 plants per hill (corresponding to a plant density of74,000 and 111,000 plants per hectare respectively) or if a spacing of 90×45 is preferred, 3 plants should be grown per hill (74000 pl. per ha).

Seed collection

Seeds of local okra strains were collected from different parts of the island and, so far, seeds from three localities, Triolet, Calebasses and Esperance Trebuchet, have been multiplied at Pamplemousses Experiment Station, Abercrombie Nursery and Richelieu Experiment Station respectively. Seed collection and multiplication would be continued, and eventually, these strains would be compared against the currently propagated variety.

8.2.2. *Lettuce (Lactuca sativa) screening trials*:

Seeds of several varieties, obtained from FAO, were sown during both winter and summer months at Barkly Experiment Station and Central Experiment Station (Réduit). Results are shown below:

TABLE 8.2

LETTUCE VARIETIES, MEAN HEAD WEIGHT, YIELD AND HEAD DIAMETER

Varieties	*Barkly-Winter Season*			*Reduit-Summer Season'*		
	Mean head weight (g)	*Yield? (kg)*	*Diameter S.E. (cm) ±*	*Mean head wieght (g)*	*Yield* (kg)*	*Diameter S.E. (cm) ±*
1. Merveille des 4 Saisons	—	—	—	222	164	33.3 ± 0.6
2. Suzan	660	489	33.9 ± 0.85	275	204	33.5 ± 1. 1
3. Reine des Glaces ...	510	378	30.2 ± 0.74	265	196	29.9 ± 0.31
4. Trocadero ...	610	452	37.9 ± 0.67	225	167	32.5 ± 0.83
5. Reine des Mages ...	490	363	29.4 ± 0.83	248	183	32.0 ± 0.67
6. Batavia ...	560	415	40.0 ± 0.89	213	157	30.6 ± 0.45
7. Germania ...	495	367	35.1 ± 0.96	240	178	34.1 ± 0.77
8. Kagranier ...	585	433	33.7 ± 0.88	250	185	33.8 ± 1.17
9. Blonde d'ete ...	—	—	—	160	119	24.9 ± 0.31
10. Lentissima a montare	710	526	36.5 ± 1.36	—	—	—

All above varieties were of the heading type (var. capitata) except Lentissima a montare which was a cos lettuce (var. Longifolia). A spacing of 45×30 cm was used and there were 90 plants per variety. Winter yields were much higher than those of summer, that being mainly due to a greater amount of leaves produced in winter. Those summer grown varieties, although yielding less, showed nevertherless that they could be cultivated in the hot season, provided they receive copious irrigation.

8.2.3 *Radish (Raphanus sativus) variety trial*

9 cultivars, imported from France, were sown in raised beds together with the local variety at Pamplemousses Experiment Station in a randomised complete block layout with three replicates. Spacing was 15×5 cm. There

*Yield calculated in kg per 100m² of bed area.

were 8 transverse rows each 1,2m long per cultivar, i.e., 240 plants per plot. Seeds were sown on the 6th September, 1980, and the radishes, harvested on 25th, 27th and 28th September. Results are as follows:

TABLE 8.3

YIELD AND ROOT CHARACTERISTICS

Cultivar	*Yield in kg per 100m² bed area*	*Root diameter S.E. (cm)*	*Root shape and colour*
1. Prelude ...	57.8[a*]	1.1 ± 0.04	Elongated, pink with white base
2. Saxerre ...	56.9[a]	1.6 ± 0.03	Deep globe, pink
3. De long pont ...	53.7[a]	1.2 ± 0.20	Elongated, pink bottom third white
4. de Sezanne ...	50.7[ab]	1.8 ± 0.03	Round, pink white base
5. Local ...	48.1[ab]	1.1 ± 0.03	Round, crimson
6. d'Orleans ...	46.9[ab]	1.1 ± 0.03	Elongated, pink bottom third white
7. Gandry ...	46.0[b]	1.7 ± 0.05	Round, pink, white base
8. Fakir ...	41.5[b]	1.8 ± 0.03	Round, pink, white base
9. Goya ...	39.1[b]	1.1 ± 0.04	Elogated, pink, white base
10. Flamboyant ...	34.4[b]	1.3 ± 0.03	Elongated, pink, white base

*Means with small letters in common are not significantly different at P = 0.05

All cultivars were of the quick maturing type, producing yields from about 40 kg per 100 m² of bed area to near 60 kg, with the local variety having an average yield within the group. The higher yielding cultivars could be recommended for growing locally.

8.2.4 *Tomato (Lycopersicon esculentum)*

Comparaison of two bacterial-wilt resistant varieties with local *pomme d'amour*:

Seedlings of *pomme d'amour*, FPI and VC/Venus were transplanted to Richelieu Experiment Station on the 10th June, 1980, in a split block layout. Each of the two blocks had three replicates. One block was irrigated, whilst the plots in the other block were rain-fed. Plot size was 6 metres square with a plant spacing of 150×60 cm. One plant was grown per hill. Fruits were harvested at the pink-ripe stage from the 21st August to the 9th October 1980. Results are as follows:—

TABLE 8.4

YIELD IN TONS/HA

Varieties	*Yield of irrigated plots*	*Yield of non-irrigated plots*
1. Pomme d'amour ...	33.4	17.4
2. FP1 ...	29.0	17.0
3. VC/Venus ...	28.0	14.6
Mean ...	30.1	16.3

There was a significant difference (P=0.05) between the yields of irrigated and non-irrigated plots. However, no significant difference in yield was detected among the varieties. Table 8.5 shows percentage fruit set:—

TABLE 8.5

MEAN FRUIT SET PERCENT IN IRRIGATED & NON-IRRIGATED PLOTS

Varieties	*Irrigated*	*Non-irrigated*
1. Pomme d'amour	87.0%	53.5%
2. FP1	79.5%	49.7%
3. VC/Venus	78.9%	49.4%

It was observed that fruit set in irrigated plants was much higher, which mainly accounted for the higher yields, obtained in the irrigated plots. The irrigated plants also grew more vigorously, as shown by their spread (table 8.6).

TABLE 8.6

PLANT SPREAD (cm)

Varieties	*Irrigated Spread S. E.*	*Non-irrigated Spread S. E.*
1. Pomme d'amour ...	150*	125.0 ± 8.3
2. FP1 ...	82.6 ± 2.8	63.4 ± 3.7
3. VC/Venus ...	84.4 ± 5.0	66.3 ± 3.3

*Inter-rows were eompletely covered by the canopy.

Pomme d'amour is indeterminate in growth habit, whereas both FP1 and VC/Venus are determinate. Although those three varieties had comparable yields in bacterial wilt free condition, the compact plant form of FP1 and VC/Venus would allow for a closer spacing, which might in turn lead to greater yields than when using the 150×60 cm spacing (as recommended for *pomme d'amour*).

8.3 SCIENTIFIC OFFICER: V. VEERAPA

8.3.1. *Bean*

A bean variety X planting date trial was carried out at Réduit C.E.S. and repeated at Plaisance E.S The bean varieties tested were Long Tom, Noorimbee, Red Kidney, Pioneer, Local Red and Victory. The planting dates at Réduit were 18.3.80, 20.5.80 and 25.7.80. The planting dates at Plaisance E.S. were 4.6.80, 6.8.80 and 16.10.80.

Table 8.7 gives the yield of green beans, the number of pods per plant and the plant height of each of the varieties, tested at Réduit C.E.S.

Table 8.7—Yield of green beans, no. of pods per plant and plant height of four varieties of beans planted on 3 dates at Réduit C.E.S.

Varieties	*Planting Date 18.3.80*			*Planting Date 20.5.80*		*Planting Date 29.7.80*	
	Yield t/ha	*No. of pods/ plant*	*Plant t/ha cm*	*Yield pods*	*No. of pods plant*	*Yield t/ha*	*No. of pods/ plant*
Long Tom ...	10.5	15	44	13.0	19	11.2	16
Noorimbee ...	9.9	14	32	12.8	16	10.9	13
Red kidney ...	2.9	4	38.5	—	—	—	—
Local Red ...	—	—	—	9.9	10	—	—
Pioneer ...	10.1	14	40	12.8	18	9.9	15
Victory ...	—	—	—	—	—	7.9	10
S.E. mean ± ...	4.21	2.59	0.35	0.96	4.59	0.74	1.33

At Plaisance E.S., the planting dates were 4.6.80, 6.8.80 and 16.10.80. Unfortunately, the third planting date suffered severe drought and had to be abandoned.

Table 8.8 gives the yield, number of pods per plant and plant height of the varieties tested at Plaisance E.S.

TABLE 8.8

Yield of green beans, No. of pods/plant and plant height of four varieties of bean planted on 4.6.80 and 6.8.80 at Plaisance E.S.

Varieties	*Planting Date 4.6.80*			*Planting Date 8.8.80*		
	Yield t/ha	*No. of Pods/ plant*	*Plant Height (cm)*	*Yield t/ha*	*No. of Pods/ plant*	*Plant Height (cm)*
Long Tom ...	12.5	18	40	9.9	15	38
Noorimbee ...	11.5	15	32	8.9	10	32
Local Red ...	8.0	10	38			
Pioneer ...	12.7	18	35	10.1	16	34
Victory ...				8.8	11	39
S.E of mean ± ...	1.06	1.89	1.76	0.33	2.36	1.66

Conclusion

From the results it appears that the 20th May is the best planting date for Réduit area, while the 4th June seems to be best for the dry areas such as Plaisance E.S. However, no significant differences have been obtained among the different yields, though variety Red Kidney has given a significantly lower yield at Réduit in the 18.380 planting date.

The analysis of the results has also shown that the different planting dates have no significant effect on the yield of beans. But further experiments should be performed with more planting dates before any definite planting date be chosen for the cultivation of bean.

8.3.2 *Soya Bean*

A variety trial on Soya Bean was carried out at Plaisance E.S., during late April 1980. The same trial was repeated at Pamplemousses E.S. at the same time. The varieties tested were Davis, Amsoy, Clark, Bragg, Harasoy, Improved Pelican and Local. The spacing adopaed was 60×15 cm. Unfortunately, the experiment had to be abandoned as very poor germination of seeds was observed for all the seven varieties.

Six varieties of Soya Bean, namely, Bossier, Calland, Cutler 71, Forrest, Ransom and Williams, were multiplied at Plaisance E.S. The spacing adopted was 60×15 cm. Table 8.9 gives the seed yields per metre row, the plant height, and the number of pods per plant of each of the six varieties.

TABLE 8.9

SEED YIELDS, PLANT HEIGHT AND NUMBER OF PODS/PLANT OF 6 VARIETIES OF SOYA BEAN

Varieties	*Secd Yield/m (rcw kg)*	*Plant Height (cm)*	*No. of pods/plant*
Bossier ...	0.02	23	13
Calland ...	0.07	22	22
Cutler 71 ...	0.07	36	19
Forrest ...	0.02	30	17
Ransom ...	0.04	18	26
Williams ...	0.06	28	19

The seeds collected were sent to Barkly E.S. to be stored. No serious diseases or pest has been observed on the plants, though a small number of leaves were eatenup by hares just before flowering started.

An International Soybean Variety Evaluation Experiment (ISVEX) was planted on 24. 11.80 at Réduit C.E.S. The sixteen varieties tested were: Tunia, Carbe, Jupiter, Williams, Davis, Acc 2120, IGH 23 JGH 24, UFV-1 (B.P-2), V-1, Alamo, F 76-8827, IGAL-125, Ecuador-1 SJ-2 and Improved Pelican.

Almost 90% flowering was observed on variety Williams on 23.12.80, when the other varieties had not started flowering.

8.3.3 *Winged Bean*

A spacing trial on Winged Bean *(Psophocarpus tetragonolobus)* was planted on 26.6.80 at Plaisance E.S. The treatment were:

1.5 m × 1 m

1.5 m × 1.25 m

1.5 m × 1.5 m

Due to the unavailibility of strong stakes, the plants left trailing on the soil. Harvest started on 1.10.80 and ended on 5.11.80. The yields of green pods obtained were generally low due to the very dry conditions prevailing during the early stages of vegetative growth.

Table 8.10 gives the mean yields of green pods, the average number of pods per plant and the length of plant, obtained by the different spacings.

TABLE 8.10

MEAN YIELDS OF GREEN WINGED BEANS PODS, THE AVERAGE NUMBER OF PODS PER PLANT AND THE LENGTH OF PLANT OBTAINED BY DIFFERENT SPACINGS

Spacing	*Mean Yields t/ha*	*Average no. of pods/plant*	*Average plant length*
1.5 × 1m ...	5.87	5	2.0m
1.5m × 1.25m ...	5.80	5	2.2m
1.5m × 1.5m ...	5.56	4	2.3m
S.E. of mean ± ...	0.173	0.34	0.28

Conclusion

No significant difference has been obtained among the different treatments. Larger spacings have given rise to a decrease in yield. It appears that spacing 1.5 m × 1 m may be best for Winged Bean. Closer spacing than 1.5 m × 1 m should be tried before any definite spacing recommendation could be made for Winged Bean.

POLE BEAN AND POLE LIMA BEAN

An observational trial to evaluate the use of local maize plants as stakes for Pole bean and Lima Bean was carried out at Plaisance E.S. Maize seeds were sown during late February 1980. The green maize cobs were harvested during early May 1980. Pole bean variety Kentucky Wonder and Pole Lima Bean variety Carolina were sown near the maize plants and on the same day, harvest of the green maize cobs was made. The trial had to be discarded because of very poor germination (1%) of the Pole bean and Lima bean seeds.

8.3.5 *Bush Lima Bean*

(i) *Multiplication*

Three varieties of bush lima bean, namely, Henderson, Kingston and Improved Bush lima, were sown during early January 1980 at Plaisance E.S. Variety Improved Bush Lima did not germinate at all. Seeds, collected from varieties Henderson and Kingston, were used in a rhizobium trial.

(ii) *Rhizobium Trial*

This trial was set up to determine the effect of three rhizoobium strains on the yield and other agronomic characteristics of two varieties of bush lima bean, namely, Kingston and Henderson. The trial was planted at Plaisance E.S. on 19.9.80. The very dry conditions prevailing at Plaisance E.S. during that period, led to very poor germination of the seeds.

The trial had to be abandoned. The seeds, collected from the remaining plants, were sent to Barkly E.S. to be stored. The amount of seeds collected were as follows:—

Variety Kingston ... 1.30 kg.

Variety Henderson ... 3.30 kg.

8.3.6 *F.A.O. Seeds*

Seeds of three varieties of Dwarf Bean, two varieties of Pole Bean and two varieties of pea were received from F.A.O. These seeds were planted for observation at Reduit C.E.S. on 16.7.80.

8.3.6.1 *Dwarf Bean*

Three varieties of dwarf bean, namely, Cannelino, Nanobobis and Borlotto, were multiplied at Reduit C.E.S. The seeds collected were sent to Barkly E.S. to be stored. Table 8.11 gives the seed yields on $18m^2$ (except for Borlotto which was measured on $10.8m^2$), plant height and the number of seeds per pod.

TABLE 8.11

AMOUNT OF SEEDS COLLECTED, PLANT HEIGHT AND NO. OF SEEDS PER POD FOR 3 VARIETIES OF DWARF BEAN

Varieties	*Wt. of secds collected*	*No. of seeds/pod*	*Average plant Height*
Cannelino ...	2.290 (on $18m^2$)	3 ± 1	45.5 cm
Nanobobis ...	1,225 kg (on $18m^2$)	3 ± 1	47.3 cm
Borlotto ...	0.940 kg (on $10.8m^2$)	3 ± 1	43.8 cm

8.3.6.2 *Pole Bean*

Two varieties of Pole Bean, namely, Blue Lake and Seme Bianco, were planted on 16.7.80 at Reduit C.E.S. The seeds were sown in double rows with a spacing of $60 \times 30 \times 10$ cm.

Variety Blue Lake produced purple flowers on the axillary nodes, while variety Seme Bianco produced white flowers with long axillary pedicel. Both varieties produced stringless pods. The green pods were harvested.

Table 8.12 gives the yield of green pods, plant height and number of pods per plant of each of the two varieties.

TABLE 8.12

YIELD OF GREEN PODS, PLANT HEIGHT AND AVERAGE NUMBER OF PODS PER PLANT OF 2 VARIETIES OF POLE BEAN

Varieties	*Yield of green pods on 10.8m²*	*Plant Height (Cm)*	*Avcrage No. of pods/plant*
Blue Lake ...	29.80 kg	300	8
Seme Bianco ...	50.60 kg	200	15

It was observed that variety Blue Lake was more susceptible to the attack of rust and so it was pre-maturely defoliated. This may be a possible reason to explain the low yield and low number of pods/plant of variety Blue Lake.

8.3.7 *Pea*

Two varieties of pea namely Lincoln and Merveille de Kelvedon were sown on 16.7.80 at Reduit C.E.S. The green pods of variety Merville de Kelvedon was harvested while variety Lincoln was multiplied.

Table 8.13 gives the yields of peas, plant height and number of pods per plant of the two varieties.

TABLE 8.13

YIELD OF PODS AND SEEDS, PLANT HEIGHT AND NUMBER OF PODS PER PLANT OF VARIETIES OF PEA

Varieties	*Yield (kg) on 24 m²*	*Plant Height*	*Average No. of pods/plant*
Merveille de Kelvedon ...	5.25 (green Pods)	32.5 cm	5 ± 1
Lincoln	0.800 (dry seeds)	40.0 cm	5 ± 1

8.4 Scientific Officer D. Y. Bachraz

8.4.1 *Strawberry Fragaria X ananassa (DUCH)*

A trial was carried out at Curepipe Experimental Station in May to compare the yields of 6 cultivars: Local, Cambridge Favourite, Cambridge Vigour, Torrey, Tioga and Fresno. Layout of the experiment was in a randomized block design with 4 replicates.

Fruits were harvested from the beginning of September and eleven harvests were performed up to the beginning of November. The experiment was carried out under rainfed conditions.

No significant difference was found among the varieties. Fresno was the highest yielder, followed respectively by Cambridge Favourite, Tioga, Local, Cambridge Vigour and Torrey.

Average yield figures are given below:—

Variety	...	Yield	M. tons/Ha
Fresno ...	...	1.62	„ „
Cambridge Favourite	...	1.39	„ „
Tioga ...	...	1.34	„ „
Local ...	...	1.19	„ „
Cambridge Vigour	...	0.92	„ „
Torrey ...	...	0.91	„ „

The yield figures have been calculated, after allowance has been made for 20% of the area to be used as paths between beds.

The trial started at Curepipe in June 1979 to compare the yield of 6 cultivars: Fresno, Tioga, Local, 1-4, 1-8 and Cambridge Rearguard was continued. Low yields were obtained from the plots. Renewal of strrawberry plants is necessary each year for satisfactory yields.

The planting date trial of cultivars Fresno and Tioga, at Curepipe E.S. was not carried out because of unfavourable weather conditions at the beginning of the year.

The same bedds were used as multiplicaton plots for these two cultivars. A good yield (below) of fruits were obtained from these plots.

Variety	...	...	Yield	M. tons/Ha
Fresno	...	...	2.04	„ „
Tioga	...	...	2.50	„ „

Propagation plots of Cambridge Favourite cultivar were started for the first time at Nouvelle Decouverte E.S. and those Cambridge Favourite, Cambridge Vigour, Local, Fresno, 1-4 and Red gauntlet were started again at Central E.S.

Introductions:

Six plants each of the cultivars, Selecta, Parfaite, Tioga and Tiobelle, were received from South Africa in July. They are being multiplied and observed in quarantine and Central E.S.

All cultivars have made vigourous growth and produced many runners.

8.42 *Citrus—Citrus* spp.

Citrus orchard Palmar

The plants in this orchard were severely damaged by cyclone Claudette in late December, 1979. After pruning, only varieties, Eureka Lemon, and Bearss lime grafted on *Citrus volkameriana* and Rangpurlime, made good regrowth. Most of the madarine and orange plants have died and the remaining ones were unthrifty.

In spite of heavy manuring, the remaining plants were showing deficiency symptoms.

Plaisance and Richelieu orchards

Trees in the new propagation and observation orchards at Richelieu and Plaisance of the same varieties from Palmar grafted on Rangpurlime, planted in July and April 1979 were growing well.

Visually, the trees seemed free from diseases except for a few symptoms of citrus canker.

Plants in these orchards will serve as a source of budwood for citrus propagation.

Seedlings of rootstock varieties, Cleopatra mandarin, Troyer citrange, and trifoliate orange, have been raised from seeds obtained locally. Ten plants of each of the above varieties together with those of Carrizo citrange and Volkamer lemon will be planted at Barkly Experimental Station to serve as mother plants for these rootstocks.

Seedilngs of *Citrus volkameriana* and carrizo citrange rootstocks were received from Reunion Island in March. They are being raised in quarantine and will be used for completing citrus orchards at Plaisance and Richelieu.

One quart of seeds of each of the above rootstocks have been imported from California in November. They have been sown at Barkly and will be used as rootstocks for grafting other citrus varieties.

8.4.3. Grapes. *Vitis* spp.

Plants of the Citronelle (Napoleon Chasselas) grape orchard at Richelieu were pruned in July. Sixty fruit clusters were produced, these being found mostly on plants, trained on trellis.

The fruits were to reach maturity by the end of November but none was harvested as they disappeared.

Pruning of this variety in July instead of September can give fruits, which mature in November before the heavy rains and cyclonic season.

Australian Varieties

These varieties, planted as cuttings in February 1978, were still under observation.

Varieties, Cardinal and sultana, were pruned at the beginning of August. One plant of each produced one fruit cluster.

The other varieties were pruned in September. Ruby seedless and Italia plants produced one cluster each, whereas the two plants of Ribier produced eleven and thirteen clusters each. Some of the fruit bunches, which were to mature by the end of January, were damaged early in the month by cyclone Florine.

Cuttings of the following varieties have been prepared at Barkly E.S. for further propagation.

Table grapes: Italia, Sultana, Ribier, Cardinal, Ruby seedless

Rootstock: Teleki, 1613, Ritcher

South African varieties

Cuttings of these varieties were transplanted in November, 1979, at Abercrombie Nursery.

The rootstock variety Jacquez made vigorous growth and produced many thick canes. Table grape varieties Muska, Pirobella and Erlihane made moderate growth during the summer months.

The plants became dormant in May and were pruned in August.

Two fruit clusters have been produced on one plant Muska.

Cuttings of Jacquez have been prepared for budding of the table grape varieties.

Introductions:

Ten cuttings each of two grape varieties, Giant Isabella and Seneca (American or *Labrusca* types), were introduced from South Africa in July.

Most cuttings of both varieties flowered in September.

They are still under observation in quarantine.

8.4.4 Passion fruit—*Passiflora* spp

A trial was started at Nouvelle Decouverte E.S. to assess the productivity of passion fruit, grown on a plantation scale.

Two cultivars, purple—*Passiflora edulis SIMS* and yellow— *Passiflora edulis SIMS forma Flavicarpa Degener* are being grown. Different types of propagation material of both cultivars are being compared:—

(1) grafted plants of local purple ...	23
(2) seedlings—kirchoff purple ...	35
(3) cuttings of local purple ...	30
(4) seedlings —Local yellow ...	35
(5) seedlings—Fiji purple ...	33
(6) seedlings—Fiji yellow ...	34
Total ...	190

The vines are being trained on a vertical trellis of single wire 3/12″ supported on Eucalyptus poles 2 metres high, 5 metres apart in rows 2.5 metres apart

The following observations are being made

(1) Longevity of each cultivar and type of propagation material used

(2) yield per plant in

(a) Pruned and unpruned plants of each cultivar

(b) Naturally pollinated and hand pollinated plants

The fruits of the locally available cultivars purple and yellow were analysed for juice yield.

Culivar	*Average fruit (weight grams)*	*Juice %*
Yellow ...	... 80	34.0
Purple ...	... 35	21.3

Introduction

Seeds of the yellow and purple cultivars were received from Fiji Seedlings raised have been included in the trial at Nouvelle Decouverte.

8.5 Scientific Officer—S. Seeruttun

8.5.1 *Papaya*

Papaya variety Azaguie, introduced from the Ivory Coast.

8.5.1 Ninety seedings were transplanted on the 23rd April, 1980, at Barkly Experiment Station in a pure stand plantation. Forty-eight seedlings were also transplanted in a pure stand at Central Experiment Station, Reduit on the same date. Eight remaining seedings were later planted at Barkly.

Spacing used at Barkly was 2.5 × 2.0 m, and at Reduit 2.35 × 2.35 m. Fertilizer rate per plant was standard, 150 g triple superphosphate + 50 g 13 : 13 : 20 : 2 complex being aplied at planting and 50 g Sulphate of ammonia 2-3 weeks later.

All plants had flowered by the 21st September, 1980. A selection was carried out in December 1980, based upon plants, having maximum number of fruits, lower bearing and regularity of bearing and development of well-formed fruits. A few flowers were bagged on the selected hermaphrodite plants for collection of seeds for further propagation.

Three male plants were uprooted at Barkly Experiment Station. Two plants were uprooted at Reduit because of severe damage by mite attack.

The sex distribution of the population is tabulated below :

TABLE 8.14

VARIETY AZAGUIE—SEX DISTRIBUTION

Station	*No. of plants*	*No. of male plants*	*No. of female plants*	*No. of Hermaphrodite plants*
Barkly ...	98	3	39	56
Reduit ...	46	0	14	32
Total ...	144	3	53	88

The fruits should be ready for harvest by February 1981.

8.5.1.2 *Papaya* variety Sunrise

Seeds of the Sunrise selection of the Solo type were received from Taiwan. Thirty-five seedlings were transplanted at Plaisance Experiment Station on the 17th July 1980.

Flowering started on 16th October 1980 and all plants had flowered by 30th October, 1980.

Two plants that had suffered from severe mite attack were removed. The development of the plants and fruits had been retarded because of the severe drought prevailing at Plaisance Experiment Station for the last four months of 1980, and the quantity of irrigation water available was insuficient.

The sex distribution of the papaya population at Plaisance Experiment Station was as follows : male : nil, female : 11 and hermaphrodite : 22.

Thirty-four seedlings of Sunrise variety were transplanted at Richelieu Experiment Station on the 5th November 1980. The plantation suffered severely from mite attack, affecting even the recruited plants.

A spacing of 2.5 × 2.0 m was used for both Sunrise plantations, and fertiliser rates were 150 g triple superphosphate +50 g 13 : 13 : 20 : 2 at planting, and 50 g 13 : 13 : 20 : 2-3 weeks later.

8.5.2. *Melon* : Observational trial at Richelieu Experiment Station

The trial was set up with 9 varieties of melon from three different sources:

From FAO	1. Charentais
	2. Retato degli ortolani
	3. Inverno verde
	4. Inverno giallo
	5. Hale's Best
From Asgrow	6. Jumbo Hale's Best
	7. Gusto 45
	8. 45-SJ
From Hurst	9. Hybrid F-1 No. 339

The seedlings (in soil blocks, sown on 27.10.80) were transplanted on the 26th November 1980. Plot size was 10 × 3 m, and spacing used was 1.5 m × 1.25 m (48 plants/plot), non replicated because of limited seeds (and seedlings) of certain varieties. Rice straw mulch was applied during the second week after transplanting.

The plants had started flowering by mid-December. Severe drought conditions and lack of irrigation water at Richelieu during December adversely affected the fruit set and the few fruits formed were damaged by fruit-fly attack.

8.5.3 *Squash* (Zucchini)

Observational Trials

Four varieties of Zucchini from FAO were planted at Curepipe Experiment Station. Seeds were sown directly on the 17th September, 1980, at the rate of 2/hole, spacing used being 6 × 6 feet. Plots were non replicated.

Harvest started for all varieties on the 4th November, 1980, and ended on the 20th December 1980, after a total of 21 harvests.

TABLE 8.15

Variety	*No. of plants at Harvest*	*No. of marketable fruits*	*No. of unmarketable fruits*	*Wt. of marketable fruit (kg)*	*Wt. of fruits per plant (kg)*	*Mean Wt of fruit (kg)*
Diamant Hybrid ...	140	353	514	293.25	2.09	0.83
Striato d'Italia ...	69	318	214	299.7	4.34	0.94
Pueblo Hybrid ...	147	610	425	567.5	3.86	0.93
Costata Romanesca	102	258	92	269.4	2.64	1.04

The mature fruits are normally 26-32 cm long and have a maximum diameter of 7-8 cm, and weight 600-1100 g. The keeping quality of fruits, not damaged by insects and disease, is very high.

The same four varieties were also planted at Barkly Experiment Station on the 15th November 1980 (from soil blocks) in an observational trial with non-replicated plots, 13.2×4.8 m. Four rows of eleven plants were set up at a spacing of 1.2×1.2 m.

The plants died a few days after cyclone Florine in early January, and were removed. Only three harvests were carried out. The yields are tabulated below:

TABLE 8.16

YIELD OF ZUCCHINI AT BARKLY EXPERIMENT STATION

Variety	*No. of fruits*	*Wt. of fruits (kgs)*
Striato Italia ...	12	6.40
Costata Romanesca ...	17	10.00
Pueblo Hybrid ...	26	12.12
Diamant Hybrid ...	40	18.80

Two varieties of Zucchini, also received from FAO, Rome, were sown in soil blocks on the 27th October, 1980 and transplanted on the 26th November 1980 at Richelieu Experiment Station. Because of limited quantity of seeds and low germination, only 8 plants of variety Nano Verde Chiaro d'Italia and 22 plants of variety Rotondo Verde were obtained. A few plants had started to flower by the end of December. These plants suffered from drought, prevailing at Richelieu and cyclone Florine in early January 1981.

8.5.4 *Cucumber*

An observational trial was carried out at Plaisance Experiment Station to compare two varieties received from FAO (Rome) with Local White and Poinsett, the latter having shown promise in previous trials.

Two replicates were planted on the flat, and a simple bamboo trellis was used for two replicates. Planting distance on the flat was 1.2 m×1.2 m, and on the trellis was 1.5×1.2 m.

Seeds were sown directly on the 16th September 1980, and plants were thinned to 2/hole two weeks after germination. Number of hills per plot was 9 on the flat, and 6 on the trellis (18 plants per plot and 12 plants/plot, respectively).

All four varieties flowered around the 27th October 1980, 41 days after sowing. Fruit set was faster on the imported varieties, and the quantity of fruits available during the first two harvests was much lower for Local White variety. The first harvest was carried out 56 days after sowing.

TABLE 8.17

YIELD OF CUCUMBER AT PLAISANCE EXPERIMENT STATION

Variety	*Means No. of fruits per plot*	*Means weight of fruits per plot kg*	*Mean No of fruit per plot*	*Mean Weight of fruits per plot kg*
Local ...	36.5	16.03	47	17.17
Poinsett ...	75	20.18	75.5	20.10
Marketer ...	68	19.00	85	25.33
Lung Degli Ortolani ...	50.5	12.70	72.5	21.33

Note—Trellis: 12 plants/plots Plot size 3.6×3.0
Flat : 18 plants/plot Plot size 3.6×3.6

8.5.5 *Watermelon*

Five varieties of watermelon, received from FAO, Rome, were sown in soil blocks on the 27th October 1980, and transplanted at Pamplemousses Experiment Station on the 2nd December 1980. The seeds were limited in quantity and germination was irregular, and only a small plantation was possible for observation. Two plants were grown per hill.

Variety		*No. of hills*
Crimson Sweet	...	10
Charleston Grey	...	10
Sugar Baby	...	10
Diamante Nero	...	10
Klondike Blue Ribbon	...	8

8.5.6 *Coconuts* (Plaisance Experiment Station)

Ten plants of coconut Malayan Dwarf Yellow, ten of Green variety, and thirteen of Red variety were selected for long-term observation of growth and yield, together with five plants of a recent Pemba plantation.

8.5.7 *Litchi*

A literature review was done on the work performed on the different aspects of the production of litchi, and presented.

8.5.8 *Mango*

Thirty-one plants of twenty-nine varieties of mangoes were selected for a systematic description of the varieties available in Mauritius. Most of the varieties had not yet ripened by the end of the year, and the work will be completed next year.

8.6 Scientific Officer: D. Reetoo

8.6.1 *Anthurium andreanum*

The growth and development of meristem plantlets of *A. andreanum* at Henrietta and Ebene were followed. At the Central Experiment Station, plants were propagated vegetatively and were planted to newly raised beds. Seventeen meristem plants of *A. andranum* were planted in November and are under observation.

A small irrigation pond has been built near the shed. Sprinklers have not yet been fixed, hence the order for one thousand meristem plantlets for experimentation was not placed.

8.6.2 *Ornamental plants in the island*

A list of ornamental plants in the island is being compiled in order to prepare descriptive notes on each viz: common name, botanical name, method of propagation, period of flowering, morphological characteristics and regions best suited to their ecological requirements.

The ornamental plants have been classified under different headings:— climbers; shrubs-foliage, flowering; tress-shade, foliage, flowering; palms, houseplants, annuals and succulents.

The preparation of descriptive notes on ornamentals is still in progress.

8.6.3 *Rockgarden at le Reduit*

The plan for a rock garden and a list of plants suitable for the rockery were prepared at the request of H.E. The Governor-General.

8.6.4 *Roses at the Royal Botanic Garden*

Budding was carried out in the nursery and fifty eight plants were now ready for planting. Budwoods from the following cultivars were taken:— Speck Yellow, Diamond Jubilee, Brigitte Bardot, Velvet Flame, Bluemoon, Spartan, Queen Elizabeth and Crimson Glory.

8.65 *Plant Introduction*

A list of ornamental plants, introduced in the island, has been compiled from the plant introduction registers and from the annual reports of the department of Agriculture from 1913 onwards.

8.6.6 *Exchange of seeds with other botanic gardens*

Letters were sent to the following botanic gardens: Singapore, South-Africa, Queensland, Australia, New Guinea; West Indies, West Bengal, India; inquiring about the availability of seeds in view of increasing the collection of ornamental plants in our botanic garden.

The following botanic gardens sent us seeds and cuttings: Kirstenborsh Botanic Garden of South Africa—seeds of protea sp. were sown at Barkly Experiment Station and Royal Botanic Garden and some ten plants have been potted.

Botanic Garden of New Guinea—seeds of Mucuna *novoguineensis* were were sown at Barkly Experiment Station and plants were sent to the Royal Botanic Garden and other experiment stations.

Singapore Botanic Garden—The following cuttings were received:—*Afgekia sericea, Bauhinia Kochiana, Strongylodon macrobotrys and Comoensia maxima,* out of which only the latter has successfully rooted in the greenhouse of the plant Quarantine, the rest had withered at the time of arrival.

The following seeds were sent to the botanic Garden, Academy of Science, USSR:—*Acanthophoenix crinita; Mascarena revaughanii and Mascarena verschaffeltii.*

Representative of Osaka Botanic Garden, Japan, collected and forwarded seeds and cuttings of hibiscus and other ornamentals to Japan. The Botanic Garden of Singapore has requested for seeds of Victoria *amazonica.* The seeds were not available and the request has been noted.

8.6.7 *Index Seminum*

A list of seeds from the Royal Botanic Garden that may be sent in exchange to other botanic gardens is being prepared.

Bougainvillea

A rooting trial with Bougainvillea sp cultivar Rosenka was carried out at Barkly Experiment Station in April. Twenty five cuttings of each hardwood, semihard wood and softwood were treated with seradix and were placed in the mistpropagator. Twenty five hardwood cuttings treated with seradix were placed on bed. The percentage of success with the hardwood, semihardwood and softwood in the mistpropagator were thirty two, twenty and four respectively whereas the hardwood on bed was only eight percent.

8.6.9 *Propagation of ornamentals*

The propagation of *Mucuna bennetti,* oil palm *(Elaeis guineensis)* and *Bauhinia corymbosa* were followed and information was collected regarding the actual procedure of propagation.

8.6.10 Jade Vine *(Strongylodon macrobotrys)*

Eleven cuttings of *Strongylodon macrobotrys* were taken from a plant in Petit Verger and were placed in the mistpropagator at Barkly Experiment Station. One cutting has successfully rooted and the plant has been potted.

3.6.11 *Hibiscus geneveii*

Four plants of *H. geneveii* (from Mondrin) were grafted at Barkly Experiment Station and two plants have been sent to the Royal Botanic Gardens.

8.6.12 *Cauliflower*

PERFORMANCE OF HEAT TOLERANT CAULIFLOWER VARIETIES AT CUREPIPE EXPERIMENT STATION

The following varieties were tested: Snow Peak, Hsi-shu, Farmers Early No. 3, Farmer's Early No.2 and Snowking. There were four planting dates: 20th September; 20th October, 20th November and 20th December. Two hundred plants of each variety were planted at a spacing of 60 cm × 60 cm.

The first planting date was the 19th September, 1980 and the harvest was started on the 29th October 1980 and ended o nthe 11th November 1980. The data collected were weight of curd, circumference of curd, Number of leaves, weight of leaves and leaf span. The colour of the curd and quality of the curd were also noted. Twenty five samples of each variety were taken at random, the mean and the standard error were calculated.

TABLE 8.18

FIRST PLANTING DATE (19.9.80)—HARVEST 29.10.80—11.11.80

Variety	*Wt. of curd*		*Circumference of curd*		*Number of leaves*		*Weight of leaves*		*Leaf span*	
	Mean (g)	*SE*	*Mean (cm)*	*SE*	*Mean*	*SE*	*Mean (g)*	*SE*	*Mean (cm)*	*SE*
Snow Peak ...	255.9	38	37.5	3.1	17	0.5	287.2	42.6	—	—
Hsi-Shu	300.8	21	42.9	1.3	17	0.6	383.1	34.9	—	—
Farmers Early No. 3 ...	384.1	24	45	1.4	17	1	336.5	23.1	—	—
Farmers Early No. 2 ...	210.1	17.9	35	1.4	19	0.6	214	21.4	—	—
Snow King ...	377.2	36.3	45.8	2	15	0.9	535.6	48.1	—	—

TABLE 8.19

SECOND PLANTING DATE (10.10.80)—HARVEST 27.11.80—13.12.80

Variety	*Wt. of curd*		*Circumference of curd*		*Number of leaves*		*Weight of leaves*		*Leaf span*	
	Mean (g)	*SE*	*Mean (cm)*	*SE*	*Mean*	*SE*	*Mean (g)*	*SE*	*Mean (cm)*	*SE*
Snow Peak ...	322.2	16	43.1	0.8	19	0.7	482.8	26	55.5	1.7
Shi-Shu	372	17.3	43.7	0.7	19	0.6	601.4	47.2	58.8	3
Farmers Early No. 3 ...	393.8	18.9	40.2	1.4	22.2	0.8	486.3	42.7	53.7	3.3
Farmers Early No. 2 ...	339.7	19.1	39.8	0.6	20	0.6	396.3	43.4	57.8	2.1
Snow King ...	—	—	—	—	—	—	—	—	—	—

Thetrial is still in progress with the third planting date (21.11.80) and the fourth planting date 23.12.80

8.6.13 *Cabbage*

Performance of heat tolerant cabbage varieties at Curepipe Experiment Station.

The varieties were spring light, summerautumn, KK cross and YR summer 50. The four planting dates were the same as for cauliflower, that is 20th September, 20th October, 20th November and 20th December. One hundred and fifty plants of each variety were planted at a spacing of 60 cm × 60 cm.

The data collected were the leaf span, diameter and weight. Twenty five samples of each variety were taken at random, the mean and the standard error were calculated.

TABLE 8.20

FIRST PLANTING DATE (18.9.80)—HARVEST (17.11.80)—9.12.80

Variety	*Diameter*		*Leaf Span*		*Weight*	
	Mean (cm)	*SE*	*Mean (cm)*	*SE*	*Mean (g)*	*SE*
Spring light	22.9	0.65	52.8	1.2	2162.5	162.1
Summer Autumn ...	23	—	63.5	0.79	2687.5	94.7
KK Cross	19.76	1.42	41.8	5.1	2996	75.2
YR Summer 50	21.56	0.7	47.8	0.57	2628	61.5

TABLE 8.21

SECOND PLANTING DATE (10.10.80)—HARVEST 13.12.80

Variety	*Diameter*		*Leaf Span*		*Weight*	
	Mean (cm)	*SE*	*Mean (cm)*	*SE*	*Mean (g)*	*SE*
Spring light	21.9	0.43	63.3	1	2560	62.9
Summer Autumn ...	24	0.54	64.4	0.9	2726	71.83
KK Cross	23.48	0.51	65.2	1.4	2652	91.6
YR Summer 50	22.8	0.56	55.8	1.5	2540	52.2

The trial is still in progress with the third planting date (19.11.80) and with the fourth planting date (23.12.80).

BARKLY EXPERIMENT STATION

8.7 SENIOR TECHNICAL OFFICER: L C. M. LI TING WAI (up to 3.2.80)
SENIOR TECHNICAL OFFICER: C. GOUGES (from 4.2.80)

8.7.1 *General*

The Station is situated at an altitude of 225 metres above sea level in latitude 20° 13.3′ and longitude 57° 27.2′ and has an average rainfall of 972 mm per annum. The soil, of the latosolic reddish prairies group, is shallow and rocky.

8.7.2 *Development*

The construction of the new potting shed has been completed and the Agricultural Engineering Division has started the construction of a new building for a seed processing complex.

The Bentall 2 Ton seed batch drier has been installed temporarily in the old potting shed pending the completion of the new Seed Processing Complex.

A new citrus orchard has been created in the Nursery Section at the request of the Chinese Agricultural Technical Team. It consists of 70 oranges var. Golden Seal grafted on Rangpur limes and 30 lemon var. Frost Eureka grafted on Rangpur lime.

8.7.3 *Weather Conditions*

The total rainfall recorded during the year was higher than the normal by 985 mm. The excessive rainfall, occuring during the beginning of the year, was responsible for a delay in the implementation of the cropping programme.

8.7.4 *Cropping Programme*

Seed Production

The programme was implemented according to the approved calendar and the following have been planted :

Bean var. Long Tom, Pioneer, Local red, Noorinbee, Broad Bean: Beetroot var. Local; Bringelle var. cipaye; Bitter Gourd var. Local; Chinese white cabbage var. Baton blanc; Celery cabbage var. Distins; Chinese radish; Coriander var. Morocco; Cauliflower var. local; Chinese spinach var. Kotachee; Cucumber var. white; Chinese cowpeas; Garlic var. Feng Shan Selection No. 1; Hot pepper var. cipaye; Leeks var. Italian Giant; Lettuce var. Blonde d'Ete, Mignonette, Tom pouce; Lalo var. Clemson spineless; Pumpkin; Radish var. Giant globe; Sweet pepper var. Chinese Giant; Snake gourd var. Local; Tomato FP I; Watermelon var. Sugar-baby.

8.7.5 *Vegetable Production*

The following were planted on bamboo trellisses on a plot of land of an area of 485m^2 under the guidance of the Chinese Agricultural Technical Team: Tomato var. Kapok and Apple green, Green Yard Long Bean, Green cucumber var. Tien Tsin, Sponge gourd, Bitter gourd var. Gaileung and Chick-qua wax gourd.

8.7.6 *Plant Propagation*

10,503 plants of various fruit tree species and 10,505 ornamental plants were produced and issued for sale to the public and for planting on different stations.

179,451 seedlings, of various vegetables were raised in soil blocks and issued for planting on Experiment Stations for seed production, experiments and vegetable production.

8.7.7 *Seed Processing Section*

After processing 51,843 kgs of seeds, 38,018 units fruits and 12,760.470 kgs of fruits, 27,459.396 kg of clean seeds of various crops (Bean, Pea, Groundnut and vegetable) were issued for storing.

17,015 seeds and 3.123 kg of small seeds of ornamentals and fruit trees were issued to Nursery Section for propagation.

201.125 kg of seeds were issued for planting at Barkly Experiment Station and other stations.

4,052 kgs of seeds (Bean and Peas mainly) unsuitable for planting were to the Livestock Feed Factory for milling.

8.7.8 *Disposal of Produce*

(i) 2,912 kgs of seeds and 890 plants were issued free to other stations and Development Works Corporation.

(ii) 1,744 kgs of seeds were issued to Abercrombie Nursery and Demonstration Centres for sale to the public.

(iii) 2,379 kgs of seeds were issued for planting on stations for seed production.

(iv) Sold to the public :

Seeds	20,510 kgs	Rs 542,482.75
Plants	18,056 units	64,266.75
Bulletins	132 units	132.00
Produce from crops	—	11,393.60
Litchi crop	—	15,000.00
Miscellaneous fruits	—	941.50
	TOTAL ...	Rs 634,216.60

Produce worth Rs 272.80 was given free of charge to various institutions on the occasion of their fancy fairs.

ABERCROMBIE NURSERY

8.8 Senior Technical Officer : D. Boodhun

8.8. *General*

Abercrombie Nursery of an area of 2 hectares is situated at an Altitude of 15 metres above sea level and has an average annual rainfall of 1163.5 mm. The soil is of Low Humic Latosols of the Richelieu Family.

8.8.2 *Development*

Eleven grape plants of the varieties Muska, Jacquez Erlihane, Ribier and Pirobella were planted.

8.8.3 *Weather Conditions*

Total rainfall obtained for the year was 1792.9 mm i.e.,54% above normal. On the 12th March, Cyclone Laure caused some damage to the mango trees, with a fair percentage of fruit-drop.

8.8.4 *Cropping Programme*

The following crops were planted for seed production during the year:—
Radish, Celery cabbage (Petsai), Eggplant (Bringelle Farcie), Hot pepper Cipaye, Chinese radish (Rave), Snake gourd and Bitter gourd.

The scarcity of irrigation water in the last months of the year hampered the seed production programme to some extent. The following were obtained from the plantations and sent to Barkly Experiment Station for processing :

10 kg Radish (seed with pods)

3.21 kg Celery Cabbage (seeds with pods)

163 selected fruits of Eggplant Farcie

701 selected fruits of Cipaye Blanc

1.5 kg chinese radish (seeds with pods)

2.650 kg clean seeds Bitter gourd

8.8.5 *Plant Propagation*

Ornamentals :

Seeds sown	...	2,700
Cuttings prepared	...	10,129

Fruit trees:

Seeds sown	...	6,390
Cuttings prepared	...	1,092
Grafts and Layers prepared	...	1,010

The plant propagation programme was disrupted to some extent by Cyclone Claudette and the heavy rainfall at the beginning of the year, which caused some damage to fruit trees and other mother plants.

1,537 Malayan dwarf yellow seednuts, imported from Malaysia, were sown in December.

8.8.6 *Mango Orchard*

The total mango crop, estimated at 56,000 fruits, consisted of 32,000 fruits of the variety Maison Rouge and 24,000 fruits of other varieties.

Part of the orchard (crop estimated at 14,200 fruits) was sold by Public Auction for Rs 17,400. Mango Baissac, Dauphine and selected Maison Rouge fruits were kept for propagation, whilst the remaining fruits were sold to the public.

8.8.7 *Disposal of Produce*

To Barkly Experiment Station, 90 potted plants for sale and 15,325 Mango Maison Rouge seeds for propagation.

To Pamplemousses Experiment Station, 6,800 Mango Maison Rouge seeds for propagation.

To Belle Vue Farm, 15 Mango grafts for planting.

To Rivière des Anguilles Demonstration Centre, 33 potted plants for sale.

To Field Services Division, 60 potted plants for planting on Trunk Road.

To various Ministries, 162 potted plants for planting.

8.8.8 *Revenue*

	Rs
Sale of seeds	28,970.50
Sale of plants	53,913.00
Sale of mango by Public Auction ...	17,400.00
Sale of other fruits	3,155.50
Sale of vegetables	358.80
Sale of Guide de Culture Vivrieres ...	109.00
Telephone Calls	19.80
TOTAL ...	103,925.60

PAMPLEMOUSSES EXPERIMENT STATION

8.9 SENIOR TECHNICAL OFFICER — D. BOODHUN

8.9.1 *General*

Pamplemousses Experiment Station of an area of 4 hectares is situated at an altitude of 69 metres above sea level and has an average rainfall of 1422.4 mm per annum. The soil is fairly flat and free from rocks with a top soil of 15 cm and is of low Humic Latosols of the Reduit Family.

8.9.2 *Weather Conditions*

Total rainfall registered for the year was 2407.67 mm which was 975.11 mm above the average for 15 years period 1965 - 1979.

The heaviest rainfall was obtained during the month of January with a precipitation of 1012.19 mm.

8.9.3 *Development*

A citrus orchard of 1415 m^2 has been established at the request of the Chinese Agricultural Technical Team.

47 Lemon var. Frost Eureka grafted on Rangpur lime and 55 orange var. Golden Seal grafted on Rangpur lime have been planted.

8.9.4 *Cropping Programme*

Only 0.22 hectare of tobacco had been planted for experiment purposes. The green leaves were sent to Richelieu Experiment Station for curing.

The seed production programme had been implemented and the following had been planted:

Groundnut local cabri, Peas local, Chinese cowpeas, Squash Golden Custard, Petsai Distins, Lettuce Mignonette, Okra Clemson Spineless, Brede de Chine Bouquet, Coriander, Cucumber. Ginger, Tobacco, Tomato, Brinjals, Beans Long Tom and Radish were planted for experiment purposes.

The yield of peas local was excellent this year with an average of 975. kg dry peas, compared to 240 kg per hectare for 1979.

THE CHINESE AGRICULTURAL TECHNICAL TEAM

A plot of 1080 m^2 had been allocated to the Chinese Agricultural Team and the following crops were planted on bamboo trellisses under the guidance of the team:

Bitter gourd var. Gaileung, Yard Long Bean, Waxgourd, Green Cucumber Tomato var. Apple Green and Kapok.

8.9.5 *Disposal of Produce*

Produce obtained from plantations was:

Groundnut Local cabri ...	3. 14 tons which yielded ...	1. 14 Tons seeds
Peas Local	865 kg which yielded ...	344. 0 kg seeds
Cucumber	1,813 fruits which yielded ...	11.370 kg seeds
Squash Golden Custard ...	1,335 fruits which yielded ...	17.342 kg seeds
Okra Clemson Spineless ...	16. 8 kg pods which yielded ...	6. 7 kg seeds
Coriander	81.450 kg rough clean seeds which yielded ...	45.011 kg seeds
Petsai Distins	249. 0 kg rough clean seeds which yielded ...	31.960 kg seeds
Brede de chine Bouquet ...	233 kg seeds with thrash which yielded ...	47.040 kg seeds
Lettuce	12. 29 kg seeds with thrash which yielded ...	1.758 kg seeds
Chinese Cowpeas ...	22. 6 kg pods which yielded ...	10.770 kg seeds

To Abercrombie Nursery 4,597 potted plants for sale.

To Barkiy Experiment Station 3,281 potted plants for sale.

To Field Services Division 2 potted plants for planting.

To Plaisance Demonstration Centre 18 potted plants for planting.

To Royal Botanic Gardens, Pamplemousses, 191 potted plants for planting.

8.9.6 *Revenue*

Total Revenue collected for sale of vegetables and fruits was Rs 4,620.05.

ROYAL BOTANIC GARDENS

8.10 Senior Technical Officer: D. Boodhun

8.10.1 *General*

Royal Botanic Gardens of an area of 26.8 hectares is situated at Pamplemousses at an altitude of 69 metres above sea level and has an average rainfall of 1422.4 mm per annum. The soil is fairly flat and is of low Humic Latosols of the Réduit Family.

8.10.2 *Weather Conditions*

Total rainfall registered for the year was 2407.67 mm which was 975.11 mm above the average for 15 years period 1965-1979.

The heaviest rainfall was obtained during the month of January with a precipitation of 1012.19 mm.

Cyclone Claudette hit Mauritius on the 22nd December, 1979. The gardens had to be closed for rehabilitation work and was opened to the public on the 25th February, 1980. Cyclone Laure hit Mauritius on the night of the 12th March, 1980 and the highest wind velocity recorded was 95 m.p.h. As the gardens were slightly damaged, these were closed to the public from 13th to 21st March, 1980.

8.10.2 *Development*

A total of 240 palm trees and 62 plants had been planted in the gardens during the year.

Acanthophoenix crinita: 17, Areca catechu: 17; Areca triandra: 28; Bentickia nicobarica: 3, Caryota urens: 5, Cocos nucifera var. Pemba: 22 Dictyosperma rubra: 3; Dypsis madagascariensis: 8, Latania verschaffeltii: 7, Livistona chinensis: 23, Livistona rotundifolia: 24, Martinezia elegans: 27, Mascarena revaughanii: 19, Nephrosperma: 4, Nephrosperma van houteana: 2, Normambya merrilli: 1, Roystonea oleacera: 12 Roystonea regia: 2, Thrinax radiata: 2, Verchafeltia splendida: 12, Washingtonia filifera: 2. Allamanda sp. 4, Alpinia purpurata: 14, Codiaeum variegatum: 6, Euphorbia pulcherrima : 28, Hornea mauritiana: 1, Lagerstroemia indica: 4, Solanum grandiflorum: 1, Thumbergia erecta: 4.

The practice of not allowing motor vehicles to enter the gardens during Sundays and Public Holidays was continued.

8.10.5 *Livestock—*

17 stags—12 females, 9 males

Fourteen surplus stags were sold for breeding purposes

21 tortoises—3 females, 6 males, 12 young ones.

8.10.6 *Visits*

During the year, there were 127,252 visits made to the gardens, including 5,822 visits made by school children.

8.10.7 *Revenue*

Revenue collected was as follows:—

	Rs
1,034 copies of ' Guide to the Royal Botanic Gardens ...	8,816.00
15,000 litchi fruits	1,510.00
Other fruits	901.00
14 stags	12,888.00

Total Revenue, collected for the year, was Rs 24,115.00

NOUVELLE DECOUVERTE EXPERIMENT STATION

8.11 Senior Technical Officer — Mrs. Lallmahomed Ciechanoswski (up to 1.7.80)

Mr. P. Ramgoolam (as from 2.7.80 to 21.10.80)

Mr. Y. N. Chan Kwing Kwan (as from 22.10.80)

8.11.1 *General*

Nouvelle Découverte Experiment Station is situated in the superhumid Zone at an altitude of 495 metres above sea level in latitude 20° 11.3′ and longitude 57° 27.25′ and has an average rainfall of 2,700 mm per annum. Activities on this station centred on the care and maintenance of an area of 3.80 hectares under mulberry plantation, an area of about 2.00 hectares under fodder and the production of some vegetables.

8.11.2 *Development*

As from the 11th August, 1980, the station which was under Field Services Division had been transferred to the Division of Horticulture. Horticultural experiments and seed production were carried out during the latter part of the year.

8.11.3 *Weather Conditions*

The total rainfall, recorded during the year 1980 amounted to 3,752 mm compared to the average normal which is 2,708 mm. The wettest month was January with a precipitation of 1,093 mm and the driest month, August with a precipitation of 67 mm.

8.11.4 *Cropping Programme*

A total acreage of 12.05 hectares of bean, peas, cabbage etc. were planted for vegetable production.

8.11.5 *Seed Production*

The following were planted for seed production:—

Crop	*Area*
Squash Golden Custard ...	2,365 m^2
Bean Long Tom	468 m^2
Cucumber white	4,700 m^2
Margoze CAM	225 m^2
Pipengaille Local	345 m^2
Pumpkin	5,850 m^2
Cowpeas Chinese	961 m^2
Watermelon Sugar Baby ...	389 m^2
Maize Local	1,080 m^2

8.11.6 *Disposal of Produce*

The following were sent to Barkly Experiment Station for seed production:—

Squash Golden Custard ...	630 units (fruit)
Cucumber white ...	663 units (fruit)
Pumpkin	1,129 units (fruit)
Bean Long Tom	51 kgs (pods)

46 tons of fodder were taken by the Livestock Division;

56,350 bamboo sticks were sent to various experiment stations;

1,726 kgs of mulberry leaves were supplied to the Entomology Division;

150 mulberry cuttings were supplied to the Forestry Service.

The various vegetables produced were sold to the staff and public and the sale amounted to Rs 2,795.05 cs.

F.U.E.L QUEEN VICTORIA

8.11.7 The following were planted for seed production:—

Bean Long Tom ...	4.0 hectares
Coriander ...	1.0 „ „
Peas Chinese ...	0.5 „ „
Pea Local ...	1.0 „ „

The Pea Chinese crop was almost totally destroyed by heavy rains.

TABLE 8.22

Barkly Experiment Station

Mean Monthly Rainfall (mm) and difference from average normal

Month	*Rainfall 1980*	*Average Normal*	*Difference from Normal*
January ...	889 mm	159 mm	+730 mm
February ...	152 mm	169 mm	− 17 mm
March ...	412 mm	199 mm	+213 mm
April ...	231 mm	100 mm	+131 mm
May ...	88 mm	60 mm	+ 28 mm
June ...	29.5 mm	49 mm	− 19.5 mm
July ...	21.5 mm	40 mm	− 18.5 mm
August ...	2.0 mm	29 mm	− 27 mm
September ...	8.5 mm	26 mm	− 17.5 mm
October ...	35.5 mm	17 mm	+ 18.5 mm
November ...	35.5 mm	38 mm	− 2.5 mm
December ...	52.5 mm	86 mm	− 33.5 mm
Total ...	1,957 mm	972 mm	+ 985 mm

TABLE 8.23

Abercrombie Nursery

Rainfall records for 1980

Month	*Mean Monthly Rainfall*	*Average for 10 year period 1964–73*	*Difference from Average*
January ...	793 mm	257.8 mm	−535.2 mm
February ...	80.9 mm	134 mm	− 53.1 mm
March ...	413.2 mm	189.6 mm	+223.6 mm
April ...	297.4 mm	118 mm	+179.4 mm
May ...	55.4 mm	57.3 mm	− 2.9 mm
June ...	18.9 mm	57.3 mm	− 38.4 mm
July ...	36.8 mm	61.9 mm	− 25.1 mm
August ...	7.0 mm	53.1 mm	− 46.1 mm
September ...	20.5 mm	27.4 mm	− 6.9 mm
October ...	30.8 mm	30.2 mm	+ 0.6 mm
November ...	12.1 mm	60.8 mm	− 48.7 mm
December ...	26.6 mm	116.7 mm	− 90.1 mm
Total ...	1,792.60 mm	1,164.10 mm	+627.50 mm

TABLE 8.24

Royal Botanic Gardens & Pamplemousses Experiment Station

Rainfall records for 1980

Month	*Mean Monthly Rainfall*	*Average for 15 years period 1964–78*	*Difference from Normal*
January ...	910.3 mm	215.5 mm	−694.5 mm
February ...	153.4 mm	184.0 mm	− 30.6 mm
March ...	443.87 mm	203.0 mm	+280.87 mm
April ...	336.55 mm	160.5 mm	+176.05 mm
May ...	164.59 mm	99.7 mm	+ 64.89 mm
June ...	72.23 mm	90.6 mm	− 18.37 mm
July ...	52.1 mm	99.3 mm	− 47.2 mm
August ...	27.9 mm	86.9 mm	− 59.0 mm
September ...	39.32 mm	51.4 mm	− 12.08 mm
October ...	79.5 mm	42.9 mm	+ 36.6 mm
November ...	15.7 mm	64.6 mm	− 48.9 mm
December ...	40.89 mm	92.0 mm	− 51.11 mm
Total ...	2,376.35 mm	1,390.40 mm	+985.65 mm

TABLE 8.25

Nouvelle Découverte Experiment Station

Hereunder is the rainfall recorded for 1980 compared to the average normal.

Month	*Mems Monthly Rainfall*	*Average normal (mm) (Ripailles)*	*Difference from normal*
January ...	1,093	335	+ 758
February ...	254	387	− 133
March ...	1,026	484	+ 542
April ...	438	269	− 169
May ...	155	243	− 88
June ...	163	170	− 7
July ...	112	177	− 65
August ...	67	136	− 69
September ...	115	148	− 33
October ...	126	53	+ 73
November ...	71	81	− 10
December ...	132	225	− 93
Total ...	3,752	2,708	+1,044

TABLE 8.26

PLANT PROPAGATION 1980 — SALES AND FREE ISSUES

	Ornamentals				*Fruit Trees*									
	Seed-lings	*Cuttings*	*Layers*	*Grafts*	*Citrus seed-lings*	*Mango seed-lings*	*Misc. seed-lings*	*Cuttings*	*Letchi layers*	*Misc. layers*	*Citrus grafts*	*Mango grafts*	*Misc. grafts*	*Coconut seed-lings*
Abercrombie Nursery ...	2,412	4,731	90	2	2,246	1,621	3,316	502	684	—	13	467	77	7
Barkly Experiment Station	3,802	6,396	115	92	2,449	545	2,785	536	809	—	146	231	62	82
TOTAL	6,214	11,127	205	94	4,695	2,166	6,101	1,038	1,493	—	159	698	139	89

	Seed-lings	*Cuttings*	*Grafts*	*Layers*	*Coconut seed-lings*	*Total*
Abercrombie Nursery ...	9,595	5,233	559	774	7	16,168
Barkly Experiment Station	9,581	6,932	531	924	82	18,050
TOTAL	18,987	12,165	1,090	1,698	89	34,218

Free Issues by Abercrombie Nursery	162
Free Issues by Barkly E.S.	1,299
Free Issues by Pamplemousses E.S.	211
GRAND TOTAL ...	35,890

SEEDS ISSUED (KG) IN 1980

Crop	Variety	To out Stations for sale	Issued free to Stations & Demonstration Centres	Sold at Barkly E.S.	Total in kg
Accacia	Local, Peru	—	13.600	12.500	25.500
Bean — Haricot	Long Tom, Local Red, Pioneer etc.	2,956.060	1,434.960	6,059.500	10,850.520
Beetroot — Betterave	Local	3.220	1.702	56.725	61.647
Bittergourd — Margoze	Local, Gaileung, CAM	20.475	3.303	24.175	47.953
Broadbean — Bokla		1.750	20.000	160.875	182.625
Cabbage — Chou	Local	2.002	0.265	18.458	20.725
Chinese white cabbage — Brede de chine	Baton Blanc, Bouquet	11.510	1.425	180.557	193.492
Calabash — Calebasse	Natal	25.545	3.870	94.725	124.140
Coriander — Cotomili	Morocco	255.500	11.930	1,277.360	1,544.790
Chilly — Piment	Cipaye, carri	1.720	0.081	3.285	5.086
Celery cabbage — Petsai	Distins	0.525	0.496	13.015	14.036
Chinese radish — Rave	Blanche	14.150	1.217	96.250	111.617
Cowpeas chinese — Voehm	Local, Yard long bean, Asparagus bean	33.950	12.685	198.930	245.565
Cucumber — Concombre	White	19.200	2.113	128.620	149.933
Cauliflower — Chou fleur	Local	1.260	1.086	11.914	14.260
Carrot — Carotte		—	0.153	—	0.153
Groundnut — Pistache	Local cabri	—	701.500	7,376.850	8,078.390
Eggplant — Bringelle	Cipaye Narain, Farcie, Rosita	11.747	0.410	65.630	77.787
Lettuce — Laitue	Mignonette, Sucrine, Tom Pouce, Iceberg, Craquant d'Eculy, Quatre Saisons, Webbs Wonderful, Blonde d'été, Reine des Glaces	2.010	0.514	13.931	16.455
Maize — Maïs	Local	2.000	40.500	46.750	89.250
Mustard cabbage — Brede de chine	Frisee, Hamchoy	6.486	1.847	59.900	68.233
Okra — *Lalo*	Local, Clemson Spineless, Piton	17.515	3.218	125.100	145.833
Onion — Oignon	Local	0.005	0.802	23.015	23.822
Pea — Petit pois	Local, Chinese	38.625	182.250	1,822.425	2,043.300
Pumpkin — Giraumon		4.000	4.580	67.520	76.100
Pomme d'amour		28.370	0.401	220.469	249.240
Radish — Radis	Giant Globe	0.700	0.638	8.980	10.318
Rice — Riz	TN1	—	750.000	1,000.000	1,750.000
Salsify — Salsifis		—	0.005	—	0.005
Snake gourd — Patole		0.075	4.037	11.085	15.197
Sponge gourd — Pipengaille	Local, C.A.T.T.	21.700	3.648	89.825	115.173
Squash — Patisson	Golden Custard	1.815	3.817	64.465	70.097
Sweet pepper — Poivron	Chinese Giant Dunputh	0.090	0.489	8.005	8.584
Chinese spinach — Brede	Kotachee, Martin, Palak	40.345	0.614	259.955	300.914
Soya Bean		—	4.200	—	4.200
Tomato — Tomate	Marglobe, Moneymaker	—	0.033	4.028	4.061
Vigna Marina		—	—	2.000	2.000
Watermelon — Melon d'eau	Sugarbaby	0.335	1.403	21.940	23.678
Winged Bean		1.000	1.030	1.450	3.480

TABLE 8.28

PROCESSING SECTION

Item	*Amount Received 1980*	
Acacia local	38.850	kg thrash
	0.755	kg rough clean seeds
Bean (Long Tom) ...	9,263.000	kg rough clean seeds
	2,079.000	kg thrash
	196.000	kg pods
Bean long yard (C.A.T.T.) ...	16.950	kg pods
Beetroot	207.785	kg thrash
Bittergourd	407	fruits
	155.100	kg fruits
	597.640	rough clean seed
Broad bean	510.000	kg pods
Cabbage	484.400	kg thrash
Calabash	459.000	kg fruits
Celery cabbage	622.360	kg thrash
Chinese white cabbage ...	1,017.850	kg thrash
Chinese spinach	56.200	kg rough clean
Chillies	50.635	kg fruits
Chinese radish	1.500	kg pods
Coriander	435.800	kg rough clean seed
Carrot	0.056	kg thrash
Cowpeas chinese ...	169.100	kg pods
Cucumber	14,410.000	kg fruits
Cauliflower	1.775	kg thrash
Eggplant	163	fruits
	705. 75	kg fruits
Groundnuts	13,521.000	kg pods
Lettuce	60.595	kg thrash
Mustard cabbage ...	1,222.150	kg thrash
Okra	746.500	kg pods
Onion	4.300	kg thrash
Peas	2,007.020	kg pods
	771.000	kg rough clean seed
Pomme d'amour ...	8,226.800	kg fruits
Pumpkin	1,383	unit fruits
Radish	10.000	kgs pods
Snake gourd	714.660	kgs fruits
Sponge gourd	573	units fruits
Squash	3,600	units fruits
Sweet pepper	3,598	units fruits
Tomato	858.375	kgs fruits
Watermelon	2,045	units fruits
Winged bean	27.3	kgs pods

IX. Agricultural Chemistry Division

HEAD OF DIVISION: L. C. LAM THUON MINE — DIVISIONAL SCIENTIFIC OFFICER

N. COONJAN — SCIENTIFIC OFFICER

9.1 *Soils*

9.1.1 The Extension Service Division submitted 80 samples of soils, collected from small planters' fields throughout the island. These samples were analysed for pH, N, P and K. The object was to assess their fertility status in order to recommend appropriate fertilizer application.

9.1.2 In connection with the experiments carried out at different experiment stations by the Horticultural Division, 14 samples of soils were received and analysed.

9.1.3 3 samples of soils from Agalega were received and analysed for pH, N, P, K, cation exchange capacity, organic matter, Mg, Mn, Fe and Zn. The results obtained are indicated in table 9.1.

TABLE 9.1.

RESULTS OF ANALYSIS OF SOILS FROM AGALEGA

Determination	*Location* — *South Island*	*North Island (Field Geanine)*	*North Island (Field Scott)*
pH	8.0	8.2	8.7
Total N (%)	0.22	0.26	0.11
Available P (ppm) ...	388	668	138
Available K (me/100 g soil) ...	0.49	0.28	0.15
C.E.C. (me/100 g soil) ...	39	34	26
Organic matter (%) ...	4.6	4.8	2.7
Mg (ppm)	44.60	31.00	36.70
Mn (ppm)	0.30	0.10	0.10
Fe (ppm)	20.00	0.80	0.80
Zn (ppm)	0.22	0.04	0.03

9.1.4 In relation to the experiments on tea conducted by he Agricultural Division, 630 samples of soils—315 top soil and 315 sub-soil—were received and analysed.

9.1.5. pH, N, P and K determinations were carried out on 7 samples of soil from Central Experiment Station, 6 from Richelieu Experiment Station, 15 from Curepipe Experiment Station and 1 from Plaisance Experiment Station with a view to correcting their pH and any nutritional deficiency.

9.2. *Fertilizers*

19 samples of compound fertilizers were received from various sources for formulation check. As regards the fertilizers maunfactured by MCFI for export, the sampling was carried out in the presence of one of the chemists of the Division.

9.3. *Miscellaneous analyses*

Some odd samples from other Divisions of the Ministry were also received for analysis.

N. N. RAMANJOOLOO—SCIENTIFIC OFFICER

9.4 *Tea Leaves*

9.4.1. In connection with the four fertilizer experiments III A, V B, XI (A and B) and XIII on tea carried out by the Agricultudal Division, 630 samples of tea leaves were received for analysis. Determination of various nutrients was performed in third and mature leaves. The analytical data obtained were forwarded to the Agricultural Division for correlation with yield. Samples of soils were also received and analysed—see under section 10.1.4.

(i) In conjunction with the experiment III A at Wooton Tea Experiment Station—to determine the biological and economic optimum rate of nitrogen application at two levels of phosphate and potash (high and low), 102 samples of tea leaves—51 third leaf and 51 mature leaf —were received in May and analysed for N, P, K, Mg, Ca, Mn, Fe, Cu and Zn.

(ii) 48 samples of tea leaves—24 third leaf and 24 mature leaf—were received in May and analysed for N, P, K, Mg, Ca, Mn, Fe, Cu, and Zn. These were in connection with the experiment V B at Wooton Tea Experiment Station—to determine the effect of time and frequency of application of phosphate and potash on the yield of tea, the nitrogen rate remaining constant.

(iii) In relation to the experiment XI (A and B) at Wooton Tea Experiment Station and Belle Rive—to determine the effect of different rates of nitrogen application on the yield of tea at different levels of phosphate and potash, 192 samples of tea leaves—96 third leaf and 96 mature leaf—were received from each experiment site in May and analysed for N, P, K, Mg, Ca, Mn, Fe, Cu and Zn.

(iv) As regards the experiment XIII at Bois Cheri—to determine the effect of different rates of nitrogen, phosphate and potash on the yield of tractor-plucked tea, 96 samples of tea leaves—48 third leaf and 48 mature leaf—were received in June and analysed for N, P, K, Mg, Ca, Mn, Fe, Cu and Zn.

9.4.2 *To study the effect of sampling at different times of the day on leaf nutrient levels*

To carry out this study, 48 samples of tea leaves from Experiment III A —24 third leaf and 24 mature leaf—were received for four successive days and analysed for N, P, K, Mg, Ca, Mn, Fe, Cu and Zn. On day 1 and day 3, the leaves were sampled at 7 a.m. and on day 2 and day 4 at 11 a.m.

9.4.3 *Monthly leaf sampling from Experiment III A*

To determine the best month for leaf sampling, 14 samples of tea leaves—7 third leaf and 7 mature leaf—were received monthly as from July 1980 for the determination of N, P, K, Mg, Ca, Mn, Fe, Cu, and Zn. Analysis will be completed in early 1981.

9.5 *Different plant samples from Wageningen Laboratory*

In order to have a control procedure for the accuracy of our analysis of tea leaves, our laboratory joined the " Wageningen Circuit " in January 1980. This consists of many participating laboratories throughout the world. Every two months, each laboratory receives six plant samples from Wageningen for the determination of various elements. The results are sent to Wageningen for compilation.

With the next set of samples, Wageningen circulates all the data and the standard deviation of the mean for each element and each sample to the participating laboratories so that they may compare their values.

In this connection, 30 different plant samples were received and analysed for N, P, K, Mg, Ca, Mn, Fe, Cu and Zn.

9.6 *Miscellaneous analyses*

Some odd samples received from various sources were also analysed.

A. H. Mohungoo — Scientific Officer

9.7 *Feedstuffs*

9.7.1 Raw materials for the manufacture of animal feeds were collected from Livestock Feed Factory and analysed for one or more of the following: fibre, protein, fat and fluorine in order to establish the correct formulation. The prepared feeds were then checked for their standards.

9.7.2 Local maize and molasses were regularly collected from Livestock Feed Factory for the determination of moisture and degree brix respectively.

9.7.3 In relation to the experiment carried out by the Agricultural Division to investigate the production of two varieties of acacia at different spacings and cutting heights, 46 samples of acacia were received and analysed for dry matter, protein and fibre.

9.7.4 In connection with various experiments conducted by the Animal Production Division, 180 samples of feedstuffs were received and analysed.

9.7.5 *Miscellaneous analyses*

Some odd samples from other Divisions of the Ministry and the private sector were also analysed.

L. C. Lam Thuon Mine — Divisional Scientific Officer
D. Chintaram — Scientific Officer

9.8. *Groundnut cakes*

Groundnut cakes were collected monthly from Livestock Feed Factory and analysed for the presence of aflatoxin. No detectable level of aflatoxin was observed.

9.9 *Citrus greening disease* (Gentisoyl Glucose)

In connection with the survey on citrus greening disease carried out by the Plant Pathology Division at different Experiment Stations, 215 samples of citrus twigs were examined for the presence of gentisoyl glucose. The results are presented in table 9.2.

TABLE 9.2.

Examination of citrus twig samples

Location	*No. of Samples*	*Gentisoyl glucose*	
		Presence	*Absence*
Central Experiment Station ...	12	Nil	12
Plaisance Experiment Station ...	35	9	26
Palmar Experiment Station ...	38	20	18
Belle Vue Experiment Station ...	130	103	27

9.10 *Pesticide residues*

9.10.1 A method was studied for residue analysis of tamaron in various crops. After addition of sodium carbonate, the crop sample was macerated with acetone. The filtrate was shaken with n-hexane which was then discarded. The aqueous-acetonic phase was saturated with sodium chloride and extracted with chloroform. The chloroform extract was concentrated by evaporation. The residue was taken up in acetone and determined by gas chromatography using phosphorus-nitrogen detector in the phosphorus mode. The 1 m×1.75 mm i.d. glass column packed with 8% Reoplex + 2% QF1 on chromosorb Q 80-100 mesh was found to to quite suitable. The following operating conditions were established: column, injector and detector temperatures at 200°C, 225°C and 650°C respectively; nitrogen carrier gas flow at 90 ml/min.

Recovery tests were carried out by adding known amounts of tamaron to samples of various crops. The details are indicated in table 9.3.

TABLE 9.3

RECOVERY (%) OF TAMARON ADDED TO VARIOUS CROPS OBTAINED BY GAS CHROMATOGRAPHY

Crop	*Amount of tamaron added (ppm)*	*No of. determinations*	*Mean recovery (%)*
Greens beans	0.4	6	69.0
Leeks	0.5	2	95.2
Carrots	0.4	2	76.2
Lettuce	0.5	4	80.0
Petsai	0.4	4	75.2
Golden Squash ...	0.4	4	67.6
Cauliflower	0.4	4	89.9
Cabbage	0.5	4	62.0
Chinese Giant Chillies ...	0.4	4	96.2
Brede de chine ...	0.5	6	92.1
Watercress	0.4	2	80.9
Tomatoes	0.4	4	67.3
Cucumber	0.4	4	80.0
Rave Blanche ...	0.5	4	77.3

9.10.2 A gas chromatographic method for determining decis residues in crops was attempted. The crop sample was extracted with acetonitrile. The extract was purified by liquid—liquid partition with acetonitrile—saturated petroleum ether and the acetonitrile phase was then shaken with a mixture of water, sodium chloride, petroleum ether and diethyl ether. The organic phase was evaporated to dryness and the residue was taken up in diethyl ether—petroleum ether in the ratio of 1 : 4. This solution was cleaned up by absorption chromatography on a Florisil column and the eluate was collected and concentrated by evaporation. The residue was taken up in hexane for gas chromatographic analysis, using electron capture detector and 1 m × 1.75 mm i.d. glass column packed with 2% MS 200/12500 CS on chromosorb G AW-DMCS 80-100 mesh. The following operating conditions were established :— column and detector temperatures at 220°C and 250°C respectively; nitrogen carrier gas flow at 40 ml/min. The method was found to be not suitable for residue work as the chromatogram obtained for the crop extract was very poor. However, the gas chromatographic technique proved to be quite satisfactory for formulation work as a good calibration curve was obtained for standard decis.

9.10.3 Various crop samples were collected at harvest from different Experiment Stations and analysed for pesticide residues by gas liquid chromatography. The data obtained were quite interesting as they were below the maximum residue limits recommended by joint FAO/WHO Codex Alimentarius Commission. The details are given in table 9.4.

TABLE 9.4

PESTICIDE RESIDUES IN CROPS FROM DIFFERENT EXPERIMENT STATIONS

Location	*Crop*	*No. of Samples*	*Pesticide*	*Residues mg/kg*
Curepipe Experiment Station ...	Watercress	4	Nogos	N.D.
Curepipe Experiment Station ...	Cucumber	1	Gardona	N.D.
Curepipe Experiment Station ...	Golden Squash	1	Gardona	N.D.
Curepipe Experiment Station ...	Cabbage	1	Azodrin	N.D.
Curepipe Experiment Station ...	Leeks	1	Azodrin	N.D.
Curepipe Experiment Station ...	Cabbage	1	Lannate	N.D.
Curepipe Experiment Station ...	Beans	1	Lannate	N.D.
Curepipe Experiment Station ...	Cucumber	1	Lebaycid	0.03
Curepipe Experiment Station ...	Cauliflower	1	Tamaron	N.D.
Curepipe Experiment Station ...	Cabbage	2	Tamaron	N.D.
Curepipe Experiment Station ...	Beans	1	Tamaron	N.D.
Barkly Experiment Station ...	Beans	1	Lannate	N.D.
Mapou Demonstration Centre ...	Tomatoes	1	Tamaron	0.05

N.D.=Not detectable

9.11 *Miscellaneous analyses*

Some odd samples from other Divisions of the Ministry and the private sector were also dealt with.

9.12 *Staff movement*

1. In May-June 1980, Mr. L. C. Lam Thuon Mine, Divisional Scientific Officer, attended a six-week training course on Pesticide Formulation organised in the German Democratic Republic by UNIDO. During his absence, Mr. N. N. Ramanjooloo, Scientific Officer, was in charge of the Division.
2. In November 1980, Mr. N. N. Ramanjooloo spent one week in Nairobi to attend a workshop organised by UNEP for National Correspondents of the International Register of Potentially Toxic Chemicals.
3. Mr. S. Bissessur, Temporary Technical Officer, was transferred to the Entomology Division on the 21st April, 1980.
4. Mr. K. H. Boodoo, Senior Laboratory Attendant, was posted to the Division on the 4th January, 1980.

9.13 *Visitor*

In February-March 1980, Mr. R. M. Baker, Agricultural Chemist from Tropical Soils Analysis Unit, Reading, spent four weeks commissioning the Soil and Plant Laboratory of the Division. He dealt mainly with methodology.

X. Entomology Division

HEAD OF DIVISION: M. J. L. MONTY, DIVISIONAL SCIENTIFIC OFFCER

10.1. *Introduction*

10.1.1. The most significant work of the Division was an attempt at eradication of the Natal fruit-flly *Pteranarus rosa* Karsch by the release of sterile flies. Details of the attempts are to be found under Chapter 10.2.

10.1.2 The stable-fly project which was initiated in 1970 was closed down in 1980. Although the population of the fly *Stomoxys nigra* Macquart were high due to abundant rains in the period January-August, control by the introduced parasites and by insecticides was satisfactory. An evaluation of the action of parasites is given in Chapter 10.3.1. Studies leading to the use of the sterile insect technique to eradicate the pest have been abandoned, in view of the high costs of mass rearing of the fly.

10.1.3. Mr. A. Joomaye, Scientific Officer, attended the Course on Ecologically Sound Pest Management Systems, organised by the International Centre for insect Physiology and Ecology in Kenya.

10.1.4. Mr. D. Abeeluck, Scientific Officer, attended the first Course on Biological Control of Pests and Weeds, organised by the Commonwealth Institute of Bilogical Control in India.

10.2. *The Natal Fruit-Fly eradication Project*

(Report of work done by:

J. Monty, Divisional Scientific Officer, Project Leader

C. Hammes, O.R.S.T.O.M. Entomologist

Mrs. I. Seewooruthun, Scientific Officer, in charge of the mass rearing of flies)

10.2.1. *Introduction*

The Natal fruit-fly, *Pterandrus rosa* Karsch is a serious pest of fruits in Mauritius. Before its accidental introduction around 1950, the Mediterranean fruit-fly *Ceratitis capitata* Wiedemann was the major pest of fruits, but it did not cause serious damage to fruits such as mango, guava, peach and loquat, commonly grown in home gardens.

The Natal fruit-fly, however, proved to be an extremely severe pest of fruits. In the early years of its introduction, it destroyed peaches and loquat, and then extended its host range to mangoes, Bullock's heart and wild guava. In the latter fruit which grows in the forest zones of the island, it found an ideal host, which maintains its population during the period March-July when only small fruits (such as Jujube, *Ziziphus jujuba*) are available.

The absence of natural enemies (despite an intensive 10-year programme of biological control), the impossibility of using insecticides in home gardens, the high potential of the fly and the abundance of fruits all year round, combined to maintain the status of the fly as the major pest of cultivated fruits.

Traditional methods of control being inadequate, the use of the sterile insect technique for eradication was contemplated in 1972. Reliable methods to rear the Natal fruit-fly were then developed. In 1977, with the technical co-operation of the French O.R.S.T.O.M., an intensive study of the ecology of the Natal Fruit Fly was started, which lasted till 1979. The host-plant list of the pest was updated and the most significant addition was that of the Indian Almond, *Terminalia catappa.* This tree grows along river courses and and is also abundant on the coast line, where it serves as shade trees in beach resort stations. The fruits are fleshly and sweet, and although non-poisonous, are not consumed by man or animals. They remain on the ground under the trees. As many as 20 flies were reared per fruit, thus illustrating the important role of the Indian Almond in the ecology of the pest.

Popualtion studies by means of (1) traps baited with the sex-attractant Trimedlure and (2) sampling of pupae in the soil, revealed that the flies existed throughout the year at high populations. The use of sterile flies could not, therefore, be contemplated, until the natural populations could be reduced to low levels, where sterile flies could be effective at acceptable costs of production.

In the Summer of 1979-80, a series of cyclones caused a dramatic decline in the natural populations of the Natal fruit-fly. Cyclone 'Claudette' hit Mauritius with its full intensity on 22nd December 1979, causing the quasi-total destruction of mangoes and other summer fruits. The succeeding cyclone and heavy down-pours in January-April 1980 had significant adverse effects on the fruiting of wild guava and Indian Almond. As fruits became rare, so became the population of the Natal Fruit-Fly, which in October, 1980, was found to be much lower than it was in October 1979.

The climatic condition of 1979-80 were exceptional and were not expected to occur again in a near future. It was, therefore, decided in 1980, that an attempt at eradication would be made using sterile flies, since the facilities to rear the insect in sufficient numbers were available. The French Government financed the operation up to an amount of FF 185,000, which were used to purchase materials for the rearing of the fly at the rate of 1 million per week for a period of 1 year.

It must be stressed that the eradication attempt is to be considered as a large scale experiment, without any guarantee of success. The flies being completely sterile, no harm coould result from the attempt, which, if unsuccessful, will still yield valuable information on the behaviour of the sterile flies. The project is described in the succeding chapters.

10.2.2. *Population studies of Natal Fruit-Fly*

(Report by O.R.S.T.O.M. Entomologist Mr. C. Hammes, translated by Technical Officer Mr. R. Soonnoo)

(a) Effect of Cyclone Claudette (22nd December 1979) on fruit production

The cyclone hit the island at the end of December, a period when there is the maximum number of fruits, mainly mangoes. Every year, these fruits contribute to the seasonal outbreak of *P. rosa.*

The immediate effect of the cyclone was the destruction of all host fruits of *P. rosa* which were at the beginning of their ripening period. This effect persisted for a number of months and few fruits were harvested from January to March 1980. Jujubes (massons) were the first fruits to appear abundantly in May 1980.

In general, if the annual sequence of host fruits during previous years is compared with that observed in 1980 (Fig. 10.1), it can be seen that a normal fruit production was re-established only in December 1980.

It was observed that, during 1980, although the fructification of jujubes was normal, that of loquat was completely disturbed, and there were no loquats in regions where it is normally predominant. Only a few loquat trees have fruits out of season in the lower regions. The fruiting time and collection of bullock's heart has also been disturbed. Indian almond and guavas *(Psidium goyava)* trees have not produced fruits in 1980, although they normally bear fruits throughout the year.

Harvest of mangoes for the 1980-81 crop has been much lower than normal as a result of the effects of the cyclone and rainy periods, thereafter. These unfavourable climatic conditions have perturbed the flowering of the mango trees. The case of the chinese guava *(Psidium cattleianum)* will be treated elsewhere.

(b) Effect of the cyclone on populations of P. rosa

The passage of cyclone 'Claudette' occurred at the beginning of the annual outbreak of population of *P. rosa.* The cyclone destroyed all host fruits but the decrease of population of adult flies was observed only in February 1980. The methods of density estimation which have been developed since two years have been used to study the population levels. Results for 1980 can thus be compared with those of preceding years.

(b.1) Trimedlure Traps

Trap studies have been maintained in orchard zones until the end of July and during the whole year in chinese guava zones (Table 10.1). In the orchard zones, a marked decrease in captures was noted as from February 1980. These have remained around 1% of captures for preceding years until the traps were removed.

In the chinese guava zones, at first, the situation was more or less unchanged. The ripening of chinese guava fruits started in March and ended in July, one month earlier than usual. Captures of adult flies increased in traps during that period. However, the maximum capture corresponded to about 40% of captures for preceding years. It can be concluded that there was an outbreak of populations of *P. rosa* in chinese guava zones in 1980, though it was less in magnitude than in preceding years.

(b.2) Soil Sampling for Pupae

This technique has been fully described in the 1979 annual report. It allows estimation of the monthly pupal population found in the soil in orchard zones.

In table 10.2 and Fig. 10.2, pupal population estimates in 1979 are compared with those in 1980. A 100% decrease in population can be noted.

This result is misleading in the sense that *P. rosa* has not been eradicated. It only indicates that the reduction is nearly 100% as in the case of captures in trimedlue traps. The method used is not accurate enough to estimate the small pupal population which existed during the first half of 1980, because pupae are thinly dispersed in the soil under trees and their collection is very difficult.

b.3 *Infestation of fruits* (Table 10.3)

Collection of available fruits was continued in 1980. The difference between the results for 1980 and those of preceding years is evident. Firstly, it should be noted that no pupa was obtained in the few fruits that were available and collected. Jujubes were the first fruits obtained in abundance and it is interesting to note that not a single pupa was obtained from these fruits. A few pupae of *P. rosa* were obtained from Indian almond fruits in July and in loquat ripening out of season. Bullock's heart fruits were also attacked by *P. rosa* but the percentage of attacked fruits, represented only 50% of those for normal years. The case for peach and mango will be treated in Section 10.3.

b.4 *Relative abundance of P. rosa and C. capitata* (Table 10.4)

The study of the relative abundance of the two species of flies, attacking fruits, is interesting, as it shows that in orchard zones, important changes have occurred in 1980. Table 10.4 shows the continuous and progressive decease of the relative percentage of *P. rosa* in captures. The relative abundance of *C. capitata* which was 20% in January increased to 90% in July.

The fact is that the population of *P. rosa* has been greatly disturbed in the first half of the year 1980. The population of *C. capitata* has, however, been restored normally, as this species of fruit fly develops in other hosts as chillies, which have vegetative cycles quite different from the usual host fruits.

b.5 *Study of populations of P. rosa in chinese guava zones in 1980* (Table 10.5)

Two important factors have modified the normal conditions existing in these zones shown by the various studies:

(i) Fruiting has been disturbed as the cyclones occurred in the flowering period of the host trees. Although the order of maturation has been followed, the red guavas maturing before the the yellow ones, the quantity of fruits produced has been lower than in preceding years. The fruiting period ended in July, that is one month earlier than usual.

(ii) The harvest of fruits has been more extensive this year, as no other local fruits were available at that time of the year.

b.5.1 *Methods of study*

A. *Number of pupae per fruit*

At the beginning, the number of pupae per fruit was lower than normal. Then it became higher than normal. This indicates that the number of flies relative to the number of fruits available was higher than normal or inversely.

B. *Percentage of Attacked Fruits*

Initially, the percentage of attacked fruits was inferior to normal and then it became higher. At the end of the season it was similar to those of preceding years. This similarity could indicate two conditions:

(i) Fruiting of yellow guavas was more abundant that the red ones.

(ii) Intensive collection of fruits by people has eliminated the adult population by suppressing pupation.

C. *Soil sampling for pupae*

Negative results were obtained in 1980. This is firstly due to the drawbacks of the sampling technique which applies to normal populations. On the other hand, the areas where sampling was carried out for the past two years were being systematically visited by people harvesting guavas while this was not the case for preceding years. However, these results indicate that the pupal population was lower than usual.

D. *Number of flies per trap per month* (Fig. 10.3)

Trappings in the chinese guava zones have been pursued during the whole year 1980. The comparative study of the mean number of flies captured monthly per trap showed that there has been a marked decrease in population.

At the beginning, the adult population was very low. It is only in June and July that the captures increased, in traps, reaching 40% of captures of preceding years. This confirms that an outbreak of population of *P. rosa* occurred in 1980, but to a lower extent, due to reasons mentioned before. As from August, the fruiting period of chinese guava was over. Fig. 10.3 shows that there was an increase in captures in October, November. The only explanation for this increase can be attributed to releases of sterile insects effected in the neighbouring areas of Black River and Chamarel. In December 1980, and January 1981, captures have been reduced to very low levels again.

The main conclusion that can be drawn for the year 1980 is the following: Even if at the beginning, the residual population was low (as in orchard zones), this was sufficient to cause a significant outbreak of adult population. It would seem that the limiting factor has been the number of fruits produced and the number of fruits falling on the ground.

10.2.3 *Eradication attempt of Natal fruit-fly by sterile insect technique*
Report on work done by J. Monty, C. Hammes and Mrs I. Seewooruttun

The major conditions, which favoured an eradication attempt in 1980 were:

1. Smallness of the island's surface and its isolation.
2. Drastic decrease of natural population levels of the fly after the cyclones.
3. Availability of information on the populations of *P. rosa* and their fluctuations.
4. Mass breeding of *P. rosa* on artificial diet could be developed in a very short time from existing colonies, first established in 1973.

A few unfavourable factors existed however. These were:

1. Inadequate technique of pupal population estimates, which had just been developed and was carried out only for eight months.
2. No information had yet been gathered on the dispersion and longevity of sterilised flies.
3. The competitiveness of sterile males had also not been studied.

Finally, although this technique had been widely studied in the U.S.A. and the Pacific, eradication had been achieved only in very exceptional cases. The only successful cases occurred in islands and after the passage of cyclones. These two conditions mainly led the Ministry to try the method in Mauritius.

10.2.3.1 *Execution of Programme*

The project was partly financed by the French Government, which has contributed mainly for the purchase of materials for mass production of insects.

The protocol was signed at the end of June 1980 and releases started effectively as from the 15th of August. However, a few preliminary releases had already been carried out as from June.

10.2.3.2 *Mass rearing of flies*

(a) Adult rearing

The adults are bred in two rooms, each being capable of holding 60 adult cages. The rooms lie on the top floor of the building, receiving adequate natural illumination from glass framed windows on three sides, an aspect of great importance, where *Pterandrus rosa* is concerned. The flies have been reported to mate only under waning light at dusk. Results of insemination tests showed that the necessary conditions were satisfied, since the percentages insemination varied from 70 to 100% for 10-day-old flies.

The temperature and relative humidity in the rooms are maintained at 25-28°C and 70-80% respectively by the use of air conditioners.

The adult cage is cylindrical, consisting of a sleeve made of nylon mosquito netting, 1 metre in length, kept in position by a plastic basin at each end. Pupae are placed in plastic boxes on the floor of the cage, 24 hours before emergence, at the rate of 200 c.c. of pupae per cage. Adult food consists of yeast hydrolysate, hung from the sides of the cage on pieces of cardboard; diluted honey, provided in pieces of sponge hung from the centre of the cage; and granulated sugar placed in a petri-dish at the bottom of the cage. The oviposition apparatus, hung from the centre of the cage consists of two funnels, held together, by a zip-fastener. Eggs are laid through holes perforated in the funnels, on to an oviposition pad made of khaki cloth, kept moist by a piece of wet wire netting.

In July, the adult breeding consisted of a total of 24 cages, which was increased gradually to about 100 in December. At present, there is a total of 120 cages. Ten cages are set every two days and they are kept for a maximum of 22 days, which give optimum egg production, according to calculations based on data from previous years.

(b) Larval rearing

There are two larval rooms, the first being fitted with two sets of shelves, each capable of holding about 250 larval trays. The second room is used both for larval trays and for the pupation of mature larvae. The temperature and relative humidity are kept at 25-27°C and 70-80% respectively.

Eggs, harvested every two days are set in larval trays made of fibre glass, at the rate of 1 cc of egg per kg of medium per tray. More medium (1 kg) is addded after four days. The larval trays are kept for 9 days, after which the mature larvae are washed off from the medium by means of a sieve, which allows the passage of the medium and very small larvae, while retaining larvae of acceptable size. These larvae are kept for pupation in sand trays. The larval trays are enclosed in tray covers, made of nylon cloth to prevent excessive drying up and contamination by other flies.

(c) The pupal stage

The larvae, after being washed, are transferred for pupation to sand trays (21″×21″) made of galvinised iron, framed by boxes of plywood 10″ high to prevent them from jumping out. After four days, on completion of pupation, the pupae are sifted from the sand. These are again sifted after another three days, when they are completely dry, so as to remove adhering sand particles and other material, left over from the larval medium. Their final volume is measured and the pupae are kept in trays, till they are irradiated or returned to the mother colonies.

(d) Mother colony

A mother colony was started in September for providing eggs for mass production of pupae. The techniques of rearing are the same as described above, but cages and larval trays are given particular attention for optimal production. Pupae for the mother colony are selected for size by sieving.

(e) The Rearing Laboratory

Mass production was carried out in a two-floor building of 4000 sq ft. floor space. The adults were reared in 2 rooms of the top-floor, receiving natural illumination through large glass-paned windows. The larvae and pupae were reared in two rooms on the lower floor, the remaining rooms serving as laboratories, stores and preparation rooms.

The building was designed to restrict the escape of flies into the environment. All essential openings were screened with nylon fly gauze and all the windows of the adult rooms were sealed. Access to the building was restricted to one entry only, guarded by double-doors. Outgoing persons were inspected to prevent escape of flies on clothing or hair.

All wash waters were disposed of in underground pits. All remains of larval media and used adult cages were treated with boiling water, before disposal outside the laboratory.

(f) Mass production and quality control

Although the project was officially scheduled to start in October, the colony of fruit-flies was transferred to a new rearing laboratory in July. After preliminary multiplications, mass production was carried out as from October.

The quality of the flies produced was controlled by tests made at each stage of production. These tests consisted of measurements of:

Egg fertility, expressed as percentage hatch.
Pupal yield, expressed as percentage of pupae obtained from eggs.
Emergence of adults from pupae, expressed as adults percent pupae.
Fertility of females determined by insemination tests.
Statistics of production are given in Tabel 10.6.

TABLE 10.6

LABORATORY PRODUCTION OF P. ROSA IN 1980

(All volumes are in ml)

Month	*Total eggs produced*	*Volume of eggs used*	*Mean % egg hatch*	*Mean Pupal yield per 100 fertile eggs*	*Volume of Pupae produce*	*Mean Volume of Pupae per tray*	*% emergence*
January ...	154	92	66.3	32.2	5,435	59.1	—
February ...	189	102	70.2	55.9	10,356	101.5	—
March ...	234	186	65.5	45.9	14,538	78.2	—
April ...	288	234	69.7	50.5	19.825	84.7	—
May ...	570	303	69.6	36.6	20,330	67.1	—
June ...	729	296	71.0	31.7	14,035	47.4	—
July ...	1,126	401	67.8	47.9	35,466	88.4	—
August ...	1,102	823	63.0	73.3	107,410	130.5	79.3
September ...	944	765	66.7	67.7	87,825	114.8	75.9
October ...	1,259	1,058	63.6	57.9	100,905	94.4	76.4
November ...	1,992	1,464	63.9	53.1	132,610	90.6	72.0
December ...	2,323	1,642	78.8	58.3	175,440	106.8	72.0

Notes: 1 ml of eggs = 12,000 1 ml of pupae = 50

(g) Sterilisation

Previous studies on radiation biology of *P. rosa* in Mauritius had shown that:

(i) Pupae irradiated with 6 K-Rads of gamma radiation 1 day before emergence, give rise to a sterility of over 95% in males and to total infecundity in females.

(ii) The competitiveness of the irradiated males relative to normal insects was reduced.

(iii) The irradiated males lived in the field for over 3 weeks, and dispersed satisfactorily.

The fruit-flies were thus treated with 6 K-rads of gamma radiation in the pupal stage, 24 hours before emergence.

The irradiator used is a Gammator manufactured by Isomedix USA. It contains Caesium-137 and delivers Gamma radidtion at the rate of 90 K-rads per hour. The irradiation chamber is relatively small and is capable of holding a cylindrical container of 700 ml. The maximum of pupae, which can be irradiated at a time is around 35,000.

After irradiation, the pupae were transferred to another building, where they were kept in suitable containers, until emergence was completed before release.

From each batch of sterilised insects, samples were kept in the laboratory for determination of percentage emergence of adults and levels of sterility. Results of these tests are given in Table 10.7.

TABLE 10.7

PRODUCTION OF PUPAE FOR PERIOD OCTOBER-DECEMBER 1980, WITH COSTS OF LARVAL AND ADULT NUTRIENTS

Month	*Volume of eggs used (ml)*	*No. of pupae obtained*	*No. of pupae returned to colonies*	*No. of pupae irradiated*	*Mean % sterility of males*	*Cost of nutrients (Rs)*
October ...	1058	5,265,000	1,609,750	3,656,250	99.5	4344.67
November ...	1464	7,072,250	1,287,500	5,784,750	99.8	7000.59
December ...	1642	9,383,000	1,630,500	7,752,500	99.9	7761.47

Notes: 1 ml of eggs=12,000

Mean cost of nutrients per 1,000 pupae=Rs 0.88

10.2.3.3 *Release of sterile flies in the field*

(a) Principles of release techniques

Previous ecological studies on the Natal fruit-fly carried out between 1977 and 1979 have revealed that the fly invades two different types of environment: (i) an orchard zone, which consists effectively of the built-up areas of towns and villages, in which fruit trees are scattered in home gardens. This zone also comprises the few orchards, sensostrictu, such as those of the sugar estates e.g. Labourdonnais in the North and Medine in the North-West, (ii) a chinese guava zone, which consists essentially of the forested areas of mountain slopes and of the catchment areas of the Central Plateau.

The 'Orchard Zone' is characterised by its wide variety of host fruits which come to maturity at various times of the year. A sequence of host fruits has been determined and it is known that at any particular time of the year, particular fruits will be available for the flies.

The 'Chinese guava zone' is characterised by its homogenous host fruit composition, the dominant fruit being chinese guava which grows wild in the forest areas of the island, particularly in the Plaines Champagne region. Chinese guava, (Red and Yellow fruits) comes to maturity at definite periods of the year (April to July) and constitutes an important source of food for fruit-flies.

Ecological studies, described in the Annual Reports for 1978 and 1979, have allowed (crude) population estimates to be made in the two zones. It is on the basis of these estimates that the programme of releases was made.

(b) Programme of releases in the Orchard Zones

The populations of the Natal fruit-fly in the orchard zone, as illustrated in Table 10.1., remained very low throughout 1980, compared to previous years. It was therefore estimated that releases of at least 200,000 flies every 2-3 days would be enough to establish a sterile: fertile insect ratio much above the desired theoretical 10.1 ratio. However, the production of flies was much higher than expected and it has been possible to release at least 300,000 flies every 2-3 days.

The releases in the Orchard Zone were carried out in a systematic way so that every village or town was innundated with sterile flies at least once every month. As the rearing improved, the number of days taken to cover the island was reduced to 21. Table 10.8 summarizes the details of releases in the 'Orchard Zone'.

TABLE 10.8

RELEASES OF STERILE FLIES IN THE 'ORCHARD ZONE' DURING 1980

Coverage	*Period*	*No. of releases*	*No. of sterile flies released*
1st ...	... 15. 8 — 11. 9.80	15	3,536,000
2nd ...	... 12. 9 — 11.10.80	15	3,559,000
3rd ...	... 12.10 — 16.11.80	18	3,816,000
4th ...	... 17.11 — 10.12.80	12	4,536,250
5th (Part) ...	... 11.12 — 31.12.80	5	2,045,250
	TOTAL	...	17,493,250

The pupae, after irradiation, are placed in plastic buckets of 5-litre capacity, at the rate of 2000 to 4000 pupae per bucket. They are kept for 3 days in the laboratory to allow emergence of flies. The buckets are taken to the release points in a vehicle, where they are opened under the canopy of host trees to let the flies escape.

(c) Programme of releases in the 'Chinese Guava Zone'

Previous population studies have shown that the density of the Natal fruit-fly in the Chinese Guava Zone is at lowest during the period October-March, i.e. before the fruiting season of chinese guava (Fig. 10.3). It was estimated that the best time to release flies in this zone was at latest mid-December and that the releases should continue till July 1981.

The Chinese Guava Zone, comprising wild areas, such as gorges and mountain slopes, the only convenient method of release was through the use of an aircraft. The Commissioner of Police kindly supplied an Helicopter for the releases.

Release cages were made from cardboard and cheap linen. Bristol boards of size 101 × 76 cm were cut in halves and each half was rolled into a cylinder, which was placed inside a sleeve of cloth. A ring of bamboo was used inside the cylinder to prevent the board collapsing. A stone was attached at one end of the cage for added weight. Up to 6000 irradiated pupae were placed in each cage and the cages were kept in the laboratory for 3 days to allow emergence.

The cages were loaded in the Helicopter at a time. At the release site, the Co-Pilot cut the top part of the linen with scissors and dropped the cage through a trap-door on the floor of the aircraft. The cages dropped straight ,either on the ground or remained suspended in trees. Flies escaped readily from the cages.

The zone was divided in 9 areas as follows:

Area 1: Mountain slopes of Tamarin, Black River and Case Noyale

Area 2: Tamarin falls, Chamarel, Fantaisie

Area 3: Plaines Champagne and Black River Gorges

Area 4: Les Mares, Mare Ory, Le Petrin

Area 5: Kanaka, Piton Savanne, Jurancon

Area 6: Montagne Blanche, Montagne Fayence

Area 7: Montagne de Hollandais

Area 8: Anse Courtois

Area 9: Nouvelle Découverte

Releases in the 9 areas were due to be completed in 1 month. Due to the high operating costs of the Helicopter, only 3 coverages of the Zone were scheduled. It was estimated that these coverages would be completed within an actual flying time of 13-15 hours. Details of releases are given in Table 10.9.

TABLE 10.9

RELEASES OF STERILE FLIES IN THE CHINESE GUAVA ZONE IN 1980

Date of releose	*Area No.*	*No. of flies released*
16.12.80	... 1	353,250
17.12.80	... 2	309,750
22.12.80	... 3	282,500
24.12.80	... 4	258,000
30.12.80	... 5	493,750
TOTAL	...	1,697,250

10.2.3.4. *Conclusion*

The rearing of the flies and the sterilisation techniques were very satisfactory. The production of pupae was well above expectations and was limited only by rearing space, the whole laboratory being fully utilised.

Surveys, using Trimedlure traps and collection of host fruits, revealed that the natural populations of the Natal fruit-fly remained much lower in December 1980 than expected. Host fruits such as mangoes were quite abundant, and remained surprisingly free from damage. Peaches appeared at Christmas on the local markets, an event which had not been seen during the past 20 years. Finally, the rearing of fruit-flies from peaches in December showed that in this fruit, the Mediterranean fruit fly *C. capitata* had becoome much more abundant than *P. rosa,* an event never observed during the year 1970-1979, when the only flies reared from these fruits were the Natal fly.

It is much too early to draw conclusions on these observations. Eradication had not been reached at the end of the year. However, the results on host fruits are indicative of the impact of the releases of sterile flies. The eradication project is scheduled to run until the end of the year 1981.

10.3 Report on work done by Scientific Officer: D. Aubeeluck

10.3.1. *Biological control of Stomoxys nigra Macquart*

Pupae of *S. nigra* were collected from sugar cane fields for the estimation of levels of parasitism throughout the year 1980.

The evaluation technique, used last year, was followed. Samples of pupae were taken inside the sugar cane trash from various localities. Pupae were kept in glass vials for up to a month to observe the emergence of parasites in the laboratory. Pupae, that failed to give rise to flies or parasites, were opened to detect the presence of parasites. If present, the pupae were considered to be parasitised.

Percentage parasitism was calculated thus:—

$$\%\text{Parasitism} = \frac{\text{No. of parasitised pupae}}{\text{No. of viable pupae}} \times 100$$

The % emergence of flies was calculated by the number of flies, emerging from the pupae collected.

Results are summarised in Table 10.10 and discussed under the following headings.

(i) *% Fly emergence*

This indirect estimate was adopted in 1979 and is an easy and quick method to show the action of the parasites in the field.

The emergence of flies for the year varied from 0 to 100% with an average 41.6%. The % fly emergence in the southern region (Savanne district) is maximum; being 75.1% ranging from 48.6 to 98.6%, but is comparatively low in the eastern and central regions of the island. There is a good correlation between the emergence of flies and % parasitism.

(ii) *Average % Parasitism*

The average monthly parasitism in pupae of *S. nigra* for the year was 39.4% ranging from 20.2 to 60.2%.

Out of 61 samples ,totalling 7626 pupae, collected and observed in laboratory, only 3 samples did not give rise to parasites.

(iii) Abundance, distribution and species composition of parasites, which emerged from pupae of S. nigra are shown in table 10.10.

Three species of the hymenopterous parasites were recovered from the field.

(i) *Tachinaephagus stomoxicida* (Encyrtidae)

(ii) *Trichopria* sp. (Diapriidae)

(iii) *Spalangia sp.* (Pteromalidae)

Tachinaephagus stomoxicida, the dominant parasite of *S. nigra* is well established in the eastern and southern regions of the island. The average monthly parasitism by *T. stomoxicida* in pupae of *S. nigra* was 29.9% *ranging* from 4.3 to 51.9%. In the southern region, namely, Savanne District, parasitism by *T. stomoxicida* is low, being 8.8%, but is higher when compared to the figures of 1979.

The other two species of parasites (namely *Trichopria* sp. and *Spalangia* sp.) were less abundant than *T. stomoxicida* throughout the island. The average monthly parasitism by *Trichopria* sp. in *S. nigra* is 7.6% ranging from 1.2 to 19.6%. Parasitism by*Spalangia* sp. is very low, average monthly parasitism being 1.9% ranging from 0 to 14 .7%.

TABLE 10.10

PARASITISM IN STOMOXYS NIGRA FROM PUPAE COLLECTED IN SUGAR CANE FIELDS DURING THE YEAR 1980

Month	*Locality*	*No. of Pupae observed*	*%Fly emergence*	*%Parasitism*			
				Tachi	*Tricho*	*Spala*	*Total*
January ...	Ebene ...	19	68.4	10.5	5.3	0	15.8
	S. Souci ...	24	12.5	58.3	0	0	58.3
	Q. Militaire	150	12.0	65.3	8.7	0.7	74.7
February ...	Bassin ...	122	78.7	0	4.9	9.0	13.9
	Chamarel ...	61	57.4	6.6	1.6	1.6	9.8
	Ebene ...	16	75.0	0	12.5	0	12.5
	Henrietta ...	170	12.3	28.8	9.4	11.7	49.9
	Q. Militaire	79	8.9	36.7	13.9	0	50.5
	Réduit ...	73	72.6	0	13.7	0	13.7
	Savannah ...	13	61.5	0	0	7.7	7.7
March ...	Bassin ...	15	26.7	0	0	33.3	33.3
	Chamarel ...	19	36.8	0	0	21.0	21.0
	Henrietta ...	328	44.8	17.3	4.6	4.6	26.5
	Réduit ...	6	100.0	0	0	0	0
April ...	Chamarel ...	11	100.0	0	0	0	0
	Henrietta ...	428	20.1	14.3	24.8	0.2	39.3
	S. Souci ...	24	29.2	25.0	25.0	0	50.0
May ...	Bassin ...	10	30.0	0	40.0	0	40.0
	Henrietta ...	223	13.0	50.2	13.2	0.9	64.3
	Réduit ...	149	59.1	6.0	13.4	0	19.4
	St. Aubin ...	51	72.5	3.9	11.8	0	15.7

TABLE 10.10—*continued*

Month	Locality	No. of Pupae observed	%Fly emergence	%Parasitism			
				Tachi	Tricho	Spala	Total
June ...	Bassin ...	4	50.0	0	0	0	0
	Ebene ...	64	51.7	18.7	10.9	0	29.6
	Henrietta ...	16	0.0	62.5	0	0	62.5
	Réduit ...	154	50.0	17.5	14.9	0	32.4
	St. Aubin ...	18	72.2	5.5	0	0	5.5
	S. Souci ...	72	26.4	41.7	18.1	0	59.8
July ...	Ebene ...	243	51.4	24.3	11.9	0.4	36.6
	Henrietta ...	138	35.5	55.8	5.1	0	60.9
	Réduit ...	101	43.6	24.8	23.8	0.9	49.5
	St. Aubin ...	222	74.8	14.8	0.9	0	15.7
	S. Souci ...	72	23.6	55.5	6.9	0	62.4
August ...	Ebene ...	112	45.5	45.5	4.5	0	50.0
	Henrietta ...	139	36.0	51.1	4.3	0	55.4
	Réduit ...	152	49.3	31.6	11.2	0	42.8
	Q. Militaire	40	65.0	20.0	7.5	2.5	30.0
	St. Aubin ...	160	81.3	11.2	0.6	0.6	12.4
	S. Souci ...	50	2.7	68.0	10.0	0	78.0
September ...	Chamarel ...	249	22.1	67.1	2.0	0	69.1
	Henrietta ...	214	43.5	32.7	7.0	0.9	40.6
	Q. Militaire	25	56.0	28.0	0	0	28.0
	St. Aubin ...	72	98.6	0.0	0	0	0
	S. Souci ...	51	15.7	66.7	3.9	0	70.6
October ...	Chamarel ...	167	3.6	81.4	0	0	81.4
	Henrietta ...	320	42.5	35.5	15.6	0	53.1
	*P. du Milieu	158	15.2	11.4	1.3	0.6	13.3
	Q. Militaire	451	68.7	24.8	0.7	0.4	25.9
	Réduit ...	288	71.5	17.4	6.9	0	24.3
	St. Aubin ...	44	90.9	4.5	0	0	4.5
	S. Souci ...	179	33.5	55.3	2.8	0	58.1
November ...	Chamarel ...	59	1.7	54.2	33.9	0	88.1
	Ebene ...	362	29.3	43.4	9.7	2.2	55.3
	Henrietta ...	70	64.3	35.7	0	0	35.7
	Q. Militaire	183	33.3	53.0	0.5	0	53.5
	St. Aubin ...	183	48.6	30.1	2.7	8.2	41.0
	S. Souci ...	128	4.7	85.9	0.8	0.8	87.5
December ...	Chamarel ...	14	21.4	42.9	7.1	0	50.0
	Ebene ...	81	7.4	72.8	4.9	1.2	78.9
	Henrietta ...	222	16.2	58.1	0.5	0	58.6
	Q. Militaire	264	12.9	65.5	0.8	0.4	66.7
	S. Souci ...	94	2.1	20.2	0	0	20.2

Tachi — *Tachinaephagus stomoxicida*

Tricho — *Trichopria* sp

Spala — *Spalangia* sp.

10.3.2 *Biological control of House flies (Musca domestica)*

The common house-fly *Musca domestica* became a nuisance in some areas, where livestock is raised in feedlots. Parasites were reared in the laboratory for releases in these areas.

A mother colony of *M. domestica* was set up in the laboratory. A large number of the Pteromalid parasites *(Spalangia* sp.*)* was recovered from pupae collected at the Poultry Farm in Reduit. The adult parasites were fed on diluted honey. They were used to build up a colony of the parasites using the pupae of *M. domestica,* produced in the laboratory.

A very cheap but efficient method was developed to breed the house-fly.

Adult house-flies were reared in nylon cages and were fed on powdered milk. The gravid females laid masses of eggs on poultry droppings placed inside the cages.

A larval medium consisting of poultry droppings (collected at Poultry Farm, Reduit) were used to raise the immature stadia of the house-flies. An adequate number of pupae of *M. domestica* was thus produced weekly using this method. The adult parasites were induced to parasitise the pupae produced in the laboratory.

The colony of the house-flies and its parasites is well established in the laboratory and enable releases of parasites, when necessary.

10.3.3 *Ectoparasites of livestock*

Studies on ticks of cattle and deer were pursued during the year, 1980. to determine the species composition and to assess levels of infestation.

Surveys were conducted from March in different regions, namely, Palmar, La Prairie, Bel Ombre an dUnion Ducray. The dominant species was found to be *Amblyomma variegatum;* its principal hosts being cattle and stags.

Live stags were not sampled as there had been no efficient method to apprehend the animals for examination. However, inquiries were made with the management of estates around the island. Infestation of*A. variegatum* is negligible in pastures of La Prairie, Bel Ombre and in the central regions of the island.

During field visits, it had been found that herds of small cattle breeders were almost free from *A. variegatum.* Cattle are infected by the ectoparasites to a remarkable degree when they are in or nearby the pastures of stags. Isolated pastures do not show signs of the pest.

Tick problems in Mauritius seem to be confined to pastures of stags, in the coastal region of the island. Cattle raised in open pastures are also susceptible to attacks of these ectoparasites.

The tick problem, if present on cattle is alleviated by dippings with suitable acaricides. The commoner acaricides, used in dipping rats, are toxaphene and organophosphorus products. Arsenical dips are not in widespread use.

10.4 *Miscellaneous reports by Divisional Scientific Officer*

10.4.1 *Leaf-miner Liriomyza trifolii*

The leaf-miner, newly recorded in Mauritius, was found to be severe mostly on potatoes and beans. It was seen damaging other crops to a lesser extent. It is apparent that the insecticides, used on vegetable crops such as tomatoes, beans and cucurbits to control other pests, check the leaf-miner quite satisfactorily.

Garlic

A large plantation of 'local' garlic at Britannia Sugar Estate was regularly inspected. During the first months of the cycle, the leaf-miner had to be controlled by sprays of insecticides. Lannate or Decis gave good control. The crop was harvested in late September and yields were good averaging 3.5 tons per arpent.

Potato

Potato plantations grown on sugar estate lands were severely affected in all regions in the first half of the year. It is believed that the severe damage observed was due to inadequate control, as normally potato is not sprayed against pests.

Potato crops ('up-to-date' variety), planted in July at Benares by Britannia Sugar Estate, was surveyed for damage by leaf-miner. At plantation, Furadan (carbofuran)was applied to the soil. The plants were free from leaf-miner damage for the first 6 weeks. As soon as the leaf-miner appeared on the lower leaves, the crops were sprayed with Decis at weekly intervals. Control was excellent. Later on when M.S.I.R.I. recommended the use of Tamaron, the sprays of Decis were confined to a small plot of $\frac{1}{2}$ acre and the rest sprayed with Tamaron.

The plantations were inspected daily by the Estate's staff and once every week by members of the Division. At no time, did the leaf-miner damage the crop significantly. Insects were abundant in the fields but miners were rare, indicating that both Tamaron and Decis prevented the development of larvae.

The exercise at Britannia Sugar Estate showed that:—

(a) Furadan applications at planting effectively protects the crops from leaf-miner damage for the first 8 weeks.

(b) The presence of large number of adult flies on the plants is a phenomenon, which is difficult to explain. The insecticide sprays do not seem to affect the adults, which feed on the younger leaves of the plants. The females puncture the leaf surface with their ovipositor and suck up the exudation. These punctures are quite conspicuous and numerous, but do not cause withering or distortion of leaves.

(c) Mines develop only on mature leaves at the base of plants.

(d) Plants, showing symptoms of virus infection (leaf-roll-or virus-Y), are much more susceptible to damage by leaf-miner. This may be explained by the early maturation of leaves of virus-infected plants.

(e) Plants from local seeds were much more affected than those from imported seed. This again may be explained by the fact that plants from local 'up-to-date' seeds mature much earlier than those from imported seeds.

(f) The leaf-miner is not difficult to control, provided that the crop is closely watched and appropriate control measures taken as and when necessary.

(g) In order to reduce control costs, the farmer may safely wait for mines to develop on the lower leaves, before starting to apply any pesticide.

(h) Both Tamaron and Decis have controlled the leaf-miner successfully.

Biological Control

Surveys for natural enemies of *L. trifolii* were continued. Mature leaves of 'Brede-de-Chine' at Barkly, grown for seeds, were severely infected with a leaf-miner, which could not be identified beyond *Liriomyza* sp., because no flies emerged from material kept in cages. Large numbers of parasites were obtained from the leaves, the dominant species, being the Eulophid *Hemiptarsenus semialbiclava* (Girault).

This parasite was also reared from *L. brassicae* in Rodrigues and it is believed that it is primarily a parasite of the cruciferous leaf-miner. Although it has been also reared from *L. trifolii* on beans and potatoes, it does not appear to be of any significant value in the control of the new pest.

Since the parasite is so abundant on crucifers such as 'Brede-de-Chine', it is suggested that this vegetable could be grown among lines of potatoes and beans. They may thus serve to attract the parasites into these fields and help to increase the populations of the parasites, which may then adapt to *L. trifolii*. 'Brede-de-Chine' has a commercial value and its pests (mostly the Cabbage Caterpillar *Crocidolomia binotalis*) do not affect potato or beans.

The introduction of specific parasites of *L. trifolii* is under study at the Commonwealth Institute of Biological Control.

Insecticide trials

Trials are being set up at Reduit on beans. It is already known (from observation on planters' properties) that Lannate, Decis, Tamaron and Tiodan are effective on beans, cucurbits, potatoes, garlic and tomatoes. Most insecticides are effective against the larvae, but the plants must be carefully sprayed, (especially when using contact pesticides), for the chemicals to be effective.

10.4.2 *Stable Flies*

The report on biological control of *stomoxys nigra* by Scientific Officer Mr. Abeeluck (Section 10.3.) shows that the parasite *Tachinaephagus stomoxicida* is firmly established in all the sugar-cane fields of the island, where *S. nigra* develops. During the first half of the year, although the weather was often wet and hot, the stable fly did not cause any problem to livestock. This was due to the action of the parasites which was quite high in January-March period. After that period, the fly's densities decline rapidly because the sugar-cane fields are no longer suitable for the breeding of the pest.

Soon after the start of the sugar-cane harvest in July, high fly densities occurred throughout the wetter parts of the island, due to continuously humid conditions prevailing since June-July. In late September, several reports from livestock owners were received, complaining of severe attacks by stable flies on their animals. Feed-lot owners in the south successfully controlled the flies by frequent applications of the insecticide Cypermethrin (Barricade) to cattle. Fogging with Cypermethrin and Dichlorvos also provides relief to cattle from bites of the flies.

In September, deer parks in Piton du Milieu, Etoile and Grand-Bassin were found to be severely infested with *S. nigra.* Space treatments with a large Swing Fog were made in the forest at Piton du Milieu and the results were excellent.

The recrudescence of flies in 1980 was caused by the usually wet conditions which have prevailed throughout the year since the Cyclone of December, 1979. However, flies were more troublesome to man than to animals and their densities have never reached the extraordinary levels recorded in the early 1970's, before the introduction of the parasite *T. stomoxicida.* Plans have been made to mass-rear the parasite next year to enable releases to be made from April to December in an endeavour to prevent the building up large populations at the start of the sugar-cane harvest.

10.4.3 *Pesticides Coontrol Board*

The Divisional Scientific Officer attended all the meetings of the Pesticides Control Board.

10.4.4 *Rhinoceros beetle, Oryctes rhinoceros*

Some surveys were conducted to assess the control of *O. rhinoceros.* Coconut trees, throughout the island in general, recovered fast from damage by the cyclones, which did not seem to have disturbed the microbial control of the beetle by the virus *Baculovirus oryctes.*

10.4.5 *Extension Work*

The Division carried out a limited number of spraying demonstrations in private properties at the request of members of the public. Severe infestations of fleas and of assassin bugs *(Triatoma rubrofasciata)* were successfully controlled by treatments with cabaryl and Cypermethrin (Barricade).

The commoner problems encountered in home gardens were found to be those caused by fruit-flies, mealy and scale insects, which are in general difficult to control satisfactorily in small gardens.

10.4.6 *Newly Recorded Pests*

(a) Anonaepestis bengalella on Custard apple

This Pyralid moth was relatively abundant throughout the island. The caterpillars feed inside the immature fruit, which become mummified and fail to ripen. The presence of the borers is apparent from the frass which accumulates in the creases, on the surface of the fruit. Treatment with contact insecticides, applied to the foliage and fruits, is effective. The synthetic pyrethoid insecticide (Decis or Cymbush) are recommended, as they can be applied up to 3 days before harvest.

(b) Mites on Coconut palms

A newly rcorded mite was observed on young coconut palms. It was identified by the Commonwealth Institute of Entomology as *Oligonychus pleg* as B.dP. *(Tetranychidae).* The mite caused extensive damage to the plants in the Grand Bay region.

(c) Flamboyant Cicadellid

The Leaf-hopper *Cernura delonixia* continued, to be very severe on Flamboyant trees. Several trees in the northern regions died and their death may have been the result of systematic defoliation over 3-4 years, followed by the severe effects of the December, 1979, cyclone. The situation is now alarming as the severity of attacks does not seem to have decreased, since the past was first observed in 1977.

(d) Thrips on Lettuce

A newly recorded pest of *lettuce* has been observed from material, submitted by the Extension Service. The vegetable was infested with a Thrips, which caused severe damage to the lower leaves. The insect was believed to be a new pest and specimens were sent to C.I.E. in September. It has been determined as Thrips sp. (probably *T. nigropilosus* recorded as a pest of pyrethrum in East Africa).

It is interesting to note in the 1969 Annual Report that an attack of Thrips on lettuce at Réduit was attributed to *T. tabaci.* This identification must now be discarded and it may be concluded that the newly recorded pest, occurred in Mauritius at least since 1969. *T. tabaci,* a cosmopolitan pest of onions, garlic and other plants, has not been reported to attack lettuce.

The importance of the pest is not yet known. However, from the specimens submitted and collected in Morcellement St. André, the damage may be significant. Lettuce in Mauritius is a vegetable not requiring pesticide usage. The new pest may change this situation and suitable pesticides will need to be carefully selected to minimize residues on this commodity, consumed uncooked.

10.5 Sericulture (Report by Scientific Officer (Entomology), Mr. A. Joomaye

10.5.1. *Moriculture*

Vuillemin Project

Maintenance work of the 8 acres of mulberry at Vuillemin was discontinued by the Development Works Corporation by the end of June and taken over by the Entomology Division. Work was continued and the fields were made ready for a second leaf harvest in early December.

In view of the parcelling of the different plots for distribution to inhabitants of Vuillemin, surveying work was started in July.

Nouvelle Découverte

Mulberry fields were maintained by the Field Services Division and Horticulture Division. About 5,000 plants were raised on nursery beds. These will be distributed to future planters.

Curepipe Experiment Station

Maintenance work in the various mulberry plantations were carried out by the Sericulture Section. The station also raised 4,000 cuttings in nursery.

10.5.2. *Rearing of Silkworm*

Pure races

The different pure races namely M_3, M_4 and M_5 were reared at Réduit laboratory for the maintenance of the pure lines and for the preparation of hybrid eggs.

During the period under report, 165 disease-free layings were reared and 114, 175 kg of fresh cocoons harvested. The average cocoon yield for 100 layings amounted to 69.197 kg. This is an excellent result and is much above than the normal average yield of 55 kg.

The average yield per 10,000 worms has also improved over last years results. It is 17.552 kg as coompared to 15.45 kg in 1979. The number of cocoons per kg has dropped from 555 in 1979 to 518 in 1980. These results confirm the better performance of the pure races.

10.5.3. *Egg production*

The three different pure races M_3, M_4, M_5 were reared at Réduit for egg production. During the year, 165 layings of the above races were reared and they produced 59,122 cocoon weighing 114.175 kg. Cocoons' selection were carried out and 2,219 cocoons were selected for pure lines and 28,067 for hybrid races. From the cocoons selected, 814 pure layings and 8,977 hybrid layings were prepared. The percentage yield was 36.7 for pure and 32 for hybrids.

10.5.4. *Hibernation of Silkworm*

Eggs of M_3, M_4 and M_5 were subjected to a 4 months hibernation programme. Two batches of M_3, M_4 and M_5 were kept at different temperatures for the period mentioned above. The percentage hatch and yields of cocoons were assessed. Table 10.11 shows results obtained.

Experimentation

An experiment to determine the effect of different spacings on the leaf yield of mulberry was set up at Curepipe Experiment Station by the end of August.

The treatments are as follows in a randomised block design in five replicates.

S1 0,6 m × 0,6 m
S2 0,6 m × 0,45 m
S3 0,6 m × 0,3 m
S4 0,6 m × 0,15 m

A fertilizer of N_{300} P_{150} K_{150} per hectare in two equal split doses were applied after each basal pruning.

Rearing by private rearers

During the period under report, farmers reared 765 layings and produced 325.65 kg of cocoons. The yield of cocoons per 100 layings averaged 42.48 kg. This result has improved over last year's result which was 37 kg.

TABLE 10.11

	Period in diapause	*Rearing period*	*% hatch*	*Yield/cocoon in kg/100 DFL*	*% Shell weight*
Batch I ...	1/3/80 to 23/6/80	July/Aug.	All above 90%	M_3 74 kg M_4 73 kg M_5 75 kg	16 to 19.5
Batch II ...	9/7/80 to 3/11/80	Nov./Dec.		M_3 64.3 kg M_4 66.4 kg M_5 70. kg	17.8 to 20

The different temperatures and the period during which both batches of eggs were kept are summarised below.

Temperature ranges

10 days at 23°c
2 days at 20°c
2 days at 15°c
3 days at 10°c
5 days at 5°c
90 days at 2.5°c
Till release 5°c

More results are needed to compare the performance of herbernating eggs over non-hibernating ones.

Extension

During the year, 172 persons were contacted at their request for Sericulture. The majority of people abandoned the idea in view of the low price of cocoons. An area of 1 A 86 P was planted by 15 farmers.

Silk reeling

The cocoons, bought from farmers, were processed before reeling; thus 344 kg of fresh cocoon were stifled and dried. The section produced 37.71 kg of raw silk during the year.

XI. Plant Pathology Division

HEAD OF DIVISION: G. M. LALLMAHOMED, DIVISIONAL SCIENTIFIC OFFICER

Introduction

11.1 The Plant Pathology Division is concerned with the prevention and control of plant diseases for crops other than sugarcane, potato, groundnut and maize. The Research staff is involved on research topics aimed at studying plant-disease relationships with a view to devise effective means of control for those diseases, thus increasing agricultural productivity. Plant diseases are also identified for the farming community and control measures recommended accordingly. Through its Plant Protection Services, the Division is responsible for the enforcement of phytosanitary legislation, regulating the importation and exportation of plant material.

11.1.1 Research investigations and experimentation carried out in the Division were on the following main topics:

(i) Selection of tomato varieties for resistance to bacterial wilt and chemical control of foliage diseases especially blight.

(ii) Selection of eggplant varieties for resistance to bacterial wilt and Phomopsis blight.

(iii) Field inspection of seed crops and health testing of seeds on sale to the public.

(iv) Chemical control of blast and purple blotch of onion and garlic.

(v) Investigations on diseases of anthurium and root knot disease of ginger.

(vi) Survey of virus diseases of tobacco and assessment of resistance in tobacco varieties to important virus diseases.

(vii) Studies on the vector-virus relationship of the Potato virus Y disease of chilly and the effect of the disease on yield.

(viii) Detection, isolation, characterization and race typing of the halo blight pathogen of bean.

(ix) Identity and characterization of the black rot disease of crucifers and assessment of resistance to the disease in newly introduced varieties.

(x) Survey of diseases of palm and characterization of the bud-rot pathogen of palm.

(xi) Inspection of imported plant material, performance and health tests on potato and newly introduced germplasm and plant quarantine..

11.2 *Tomato*—Resistance to bacterial wilt (G. M. Lallmahomed, M. Chinnappen & N. R. Leckraz)

11.2.1 *Bacterial wilt resistance tests*

Experimental

Seven cultivars of tomato were tested for their resistance to the bacterial wilt disease in heavily contaminated plots at Pamplemousses Experiment Station during the cool season (i.e. April-July 1980) and the warm season (October 1980-January 1981). The lay-out was a randomized complete block design in four replicates with 50 plants per plot size of 216 sq ft. Seeds were sown i nsterile soil, seedlings were earthballed after 3 weeks and transplanted after a further period of 5-10 days. Planting distance was 3 ft between rows and 2 ft along rows, plots being spaced 4 ft from each other. The complete fertiliser 13-13-20-2 at the rate of 10 g + ½ kg Farmyard manure were added at planting. Weekly sprays of Ditthane M/45 plus insecticides were performed to control fungal diseases and insect pests. Disease assessment was through counts of wilted plants made at weekly intervals. Wilted plants were uprooted and brought to the laboratory for confirmation of the bacterial wilt disease by a Xylem Ooze test. Yield data were taken from harvests of mature fruits. which were made twice weekly during about one month.

TABLE 11.1 — PERFORMANCE OF TOMATO CULTIVARS AT PAMPLEMOUSSES EXPERIMENT STATION

	1st Experiment April — July 1980			*2nd Experiment October 80 — January 81*		
	*Diseased plants** %	*Yield per plot* (kgs)	*Yield/ Arpent*‡ metric tons	*Diseased plants* %	*Yield per plot* (kgs)	*Yield/ Arpent* metric ton
V/c Saturn ...	5.0[a]	86.0[a]	18.08	9.1[a]	57.75[a]	12.15
V/c Venus ...	9.0[a]	85.7[a]	17.8	18.4[a]	48.37[b]	10.17
FP_1 ...	6.0[a]	72.9[a]	15.3	14.5[a]	54.63[b]	11.49
FP_1 (MPW) ...	4.0[a]	79.7[a]	16.7	19.5[a]	51.6 [b]	10.86
CRA–53–RCB	47.0[b]	8.6[b]	1.8	37.3[b]	35.34[c]	7.43
Carette ...	69.0[b]	2.1[b]	0.44	62.6[c]	10.6 [c]	2.2
Local ...	92.0[b]	0.1[b]	0.02	93.2[d]	4.87 [c]	1.02

*Percentage data were converted to equivalent angles prior to statistical analysis

†Small letters indicate Duncan's Multiple Range grouping which do not differ significantly

‡Converted values

Results and Discussion

Relevant data are presented in table 11.1. Varieties V/c Venus, V/c Saturn and FP_1 have shown high tolerance to the bacterial wilt disease. Selection FP_1, a cross between the wilt-tolerant line Vc_4 from Philippines and Tawau Pink from Tawau-Sabah, was obtained from the University of Malaysia as seeds of the F_6 generation. Selections were carried out during several generations in heavily bacterial-wilt contaminated plots. Yields of such selections tested in the trials carried out during the cool and warm seasons, indicate that the variety FP_1 is indeed a suitable variety under Mauritian conditions. However, yields were not significantly superior to those of the Taiwan varieties, V/c Venus & V/c Saturn, during the cool season although V/C Saturn produced significantly higher yields during the warm season. FP_1 is a dwarf, determinate variety with an average fruit weight of 40g. It resembles our local pomme d'amour in that it is of small type and quite acidic and does not need any staking. Further selection work is in progress.

11.2.2 *Single plant selections—Fields trials*

Single plant selections made during the 1979 season were tested for their performance in wilt contaminated plots at Réduit (Plant Pathology trial plot) and Pamplemousses Experiment Station from January to April 1980. Out of thirty different selections tested for that purpose, six wilt tolerent selections with high yields were retained for further assessment in wilt contaminated plots at Réduit (Plant Pathology trial plot) during August through November 1980. The lay-out was a randomized complete block design with 4 replicates containing 25 plants per plot size of 96 sq. ft. Current agronomic practices were applied as described in the previous section. Disease assessment was through count of wilted plants, made at weekly intervals. Relevant data are presented in table 11.2.

TABLE 11.2

PERFORMANCE OF FP_1 TOMATO SELECTION AT RÉDUIT PLANT PATHOLOGY TRIAL PLOT

Selection No.	*% wilted plants**	*Yield per plot (kg)*	*Yield per arpent (metric tons) (converted values)*
1. S_3 CES/80 ...	20.0[a]	53.21[a]	22.17
2. MSP/80/13 ...	15.0[a]†	51.97[a]	21.65
3. S_3 CES/80 ...	17.0[a]	50.55[a]	21.06
4. S_{10} P79/12 ...	17.0[a]	48.67[a]	20.27
5. S_4 P 80/13 ...	19.0[a]	45.63[a]	19.03
6. S_3 P 80/13 — G.S. ...	15.0[a]	42.75[a]	17.81
7. Local ...	58.0[b]	17.40[b]	7.25

*Percentage data were converted to equivalent angles prior to statistical analysis.

†Small letters indicate Duncan's Multiple Range grouping which do not differ significantly at the 5% level.

Results show that there was no significant difference in the performance of the various selections of FP_1 variety indicating the stability of the variety as far as resistance to bacterial wilt and yields were concerned. FP_1 has now proved its superiority to the local variety which it should replace without any problem.

11.2.3 *Chemical control of Late and Early blight of tomato* (M. Chinapen & T. Rawananshah)

Emphasis was laid in this experiment on the use of different formulations of Ridomil (25 WP and,5G) alone or in combination with Dithane M 45 for the control oflate *(Phytophthora infestans)* and early *(Alternaria solani)* blight of tomato.

In April 5, 1980, tomato transplants of the variety FP_1 were planted at Réduit Central Experimental Station. The field had a long history of tomato diseases. Plots were arranged in a randomised block design with four replications. There were forty plants per treated plot. Plants were spaced 3 ft. along rows and 2 ft. in between rows. The weather was normal and plants were irrigated as needed. Ridomil 5G was added at planting and the other chemicals were applied weekly as foliar sprays using a Knapsack Sprayer at 45 psi. Insecticides were applied to the entire field weekly. Assessment was done visually every week, for percentage defoliation by early and late blight. Yields were taken from 12 plants of the middle rows. There were six harvests starting on June 20, 1980.

Relevant data are shown in table 11.3.

TABLE 11.3

CHEMICAL CONTROL OF EARLY AND LATE BLIGHT OF TOMATO

1st Expt.: April-July 1980 82nd Expt.: Sept.-December 1980

Treatment and product rate	*Yield (kgs)/plot (12 plants)*		*% Defoliation, Early and late blight**	
	1st Expt.	*2nd Expt.*	*1st Expt.*	*2nd Expt.*
‡Ridomil 25 wp (0.5 gm/litre) + Dithane M45 (1 gm/litre) ...	12.8[a]†	23.3[a]	1.3[a]	1.0[a]
Ridomil 5G (2 gm/plant)+Dithane M45 (1 gm/litre)	10.5[a]	20.8[a]	1.3[a]	1.2[a]
Ridomil 5G (1 gm/plant)+Dithane M45 (1 gm/litre) ...	10.5[a]	19.7[a]	1.7[ab]	1.2[ab]
Ridomil 25WP (1 gm/litre) ...	8.2[ab]	18.08[a]	5.6[ab]	5.0[ab]
Ridomil 25WP (0.5 gm/litre) ...	7.8[ab]	17.3[a]	13.0[ab]	12.0[ab]
Ridomil 5G (0.5 gm/plant) ...	4.7[bc]	16.9[a]	20.7[b]	20.0[b]
Dithane M45 (2 gm/litre) ...	3.3[bc]	15.6[a]	20.7[b]	20.0[b]
Control	0.7[c]	5.0[b]	86.6[c]	85.0[c]

*Percentage data were converted to equivalent angles prior to statistical analysis

†The small letter indicates Duncan's Multiple Range grouping of treatment which do not differ significantly at the 5 per cent level.
Assessment of attack on foliage was performed visually using the following key (British Mycol. Soc. Vol. 31, 1947 p. 140–141) 0 — not seen on plot, 100 — all leaves dead, stems dead or dying.

‡Ridomil — N — (2, 6 — dimethyl phenyl) — N — methoxyacetyl) alanine

Results and discussion

Foliage diseases were more effectively controlled using combinations of Ridomil and Dithane M45 than using the fungicides separately. Wettable spray or granular formulations were equally good in controlling the disease. However, yield data indicate a slight superiority of wettable spray formulation of Ridomil over granular ones. Further trials are warranted during heavy blight seasons, as, during the second season September-December, late blight was moderate, whereas early blight *(Alternaria solani)* was quite severe.

11.2.4 *Chemical control of root-knot nematode (Meloidogyne spp.)*

(M. Chinappen, T. Rawananshah & S. Hanoomanjee)

A preliminary experiment was carried out in the greenhouse at Reduit to assess the effect of four nematicides on root-knot incidence in tomato var. Local. Soil from an infested field was potted in plastic bags (100) and placed in a latin square design on wooden benches. The soil was inoculated using a Philips Vaccinator Model 74 on May, 26, with 700-900 second stage larvae per pot. Tomato seedlings were planted in each pot for population build-up. After six weeks, the plants were uprooted and soil from the pots mixed. An assessment of a sample of 100 gm of soil showed the presence of 242 larvae (2nd stage).

The soil was mixed thoroughly and were potted in 100 plastic bags. Each pot contained approximately 1500 2nd stage larvae. The pots were placed in a latin square design on wooden benches in the green house. Treatments were performed on 23 July 1980 and tomato seedlings were planted in the pots 2 days later. The plants were removed after 7 weeks and assessed for root galls as per Zeck W. M. 1971, 0—No galls; to 10—plants and roots dead.

TABLE 11.4

EVALUATION OF NEMATICIDAL CONTROL OF TOMATO ROOT-KNOT NEMATODES

Treatment	*Mean root-knot indices*	*Average length of stem* (cms)	*Average length of roots* (cms)	*Average fresh wt. of roots* (gms)	*Average dry weight of roots* (gms)
Vydate 10G — 0.5g/ pot plot ...	14.5[a]*	26.06[a]	21.04[a]	7.42[a]	0.6[a]
Vydate L — 0.5 cc/ litre (a drench of 200 cc/ pot)	22.0[a]	26.05[a]	22. 9[a]	8.01[ab]	0.8[a]
Furadan 10G — 0.5g/ pot	31.5[a]	24. 3[a]	22.12[a]	7.95[ab]	0.5[b]
Bunema — 0.5 cc/litre (a drench of 200 cc/ pot)	46.0[b]	19.12[b]	15.36[b]	11.29[ab]	1.21[c]
Control	59.5[c]	19.59[c]	12.03[b]	17.5[c]	1.55[d]

*The small letter indicates Duncan's Multiple range groupings of treatment which do not differ significantly at the 5 per cent level.

†Zeck., N. M. (1971). Pflanzenschutz — Nachrichten Bayer 24: 141–144.

Results, shown in table 11.4., indicate the suitability of using nematicides against root-knot nematodes. Vydate 10G, Vydate L and Furadan 10G were effective in controlling root-knot nematodes. Although Bunema was equally effective it was slightly phytotoxic. Further trials on a field scale are necessary.

11.3 *Egg Plant*

Assessment of resistance to bacterial wilt, and phomopsis blight in egg-plant varieties (M. Chinappen, T. Rawananshah & G. M. Lallmahomed)

11.3.1 *Field trials*

Pamplemousses Experiment Station—Bacterial wilt (*Pseudomonas solanacearum*)

Eleven egg-plant varieties were sown in sterilised soil on 30th April, 1980 and transplanted to the field on June 5. Varieties planted were:—L 17, Florida Highbush, Bonica F_1, Black Beauty, Ping Tong Long, Lange Violette, Cipaye Narain, Multiple DingraA, Rosita, Cipaye blanc, Baluroi F_1. The plants were arranged in a randomised block design with 4 replicates. There were 20 plants per replicate. The planting distance was 3 ft×4 ft. Pesticides were applied to control pests and diseases. The fields had a long history of disease infestation.

Assessment:—The number of wilted plants were counted and xylem ooze test carried out in the laboratory to confirm the presence of bacterial wilt. Varieties L 17, Dingra multiple A, Cipaye blanc and Ping Tong Long showed good resistance to bacterial wilt. Results are shown in table 11.5.

TABLE 11.5

ASSESSMENT OF EGGPLANT VARIETIES FOR RESISTANCE TO BACTERIAL WILT

Variety	*Origin*	*% of wilted plants*
L 17	... Antilles ...	9^{a*}
Dingra Multiple Purple A	... India ...	11^{a}
Cipaye Blanc ...	... Local ...	13^{ab}
Ping Tong Long ...	... China ...	23^{ab}
Cipaye Narain ...	... Local ...	37^{bcde}
Black Beauty ...	... U.S.A. ...	53^{cdef}
Bonica F_1	... Holland ...	58^{defg}
Florida Highbush ...	... Holland ...	65^{efgh}
Baluroi F_1	... Holland ...	72^{fgh}
Rosita	... Local ...	82^{gh}
Lange Violette ...	... Holland ...	86^{h}

Percentage data were converted to equivalent angles prior to statistical analysis.

*Small letters indicate Duncan's Multiple Range groupings which do not differ significantly at 5% level.

11.3.2 *Reduit Plant Pathology Trial Plot*—Phomopsis blight (*Phomopsis vexans sacc.*)

The eleven varieties were planted on June 5, 1980, to assess resistance to phomopsis blight. The varieties were planted in rows of 10 plants, and the distance between the plants was 3 feet. No fungicide sprays were applied to the plants; insecticides Nuvacron 0.5 c.c/litre alternating with Folimat 0.5 c.c/litre were applied at weekly intervals. On the 24th December, 1980, the plants were assessed visually for disease reaction-stem and leaf separately. The following key was used *leaf*: O—no visual disease symptoms; 1— the lowest leaves showing disease symptons; 2 about 60% of total foliage, showing disease symptoms on older leaves; 3 more than 60% of total foliage showing disease symptoms. *Stem*: 0—No visual symptoms; 1—stems showing disease spots but otherwise growing normal; 2—stem partially dead; 3—entire stem permanently wilted and dead (Ref.—T. S. Kalda et al; India J. Veg. Sci. 3: 65-70—1976).

TABLE 11.6

ASSESSMENT OF EGG PLANT VARIETIES FOR FIELD RESISTANCE TO PHOMOPSIS BLIGHT

Variety	*Origin*	*Disease Index**	
		Leaf	*Stem*
Black Beauty ...	U.S.A. ...	78.0	75.0
Rosita	Local ...	100.0	90.0
L 17	Antilles ...	0.0	10.0
Florida Highbush ...	Holland ...	27.8	32.8
Bonica F_1	Holland ...	95.0	86.0
Baluroi F_1	Holland ...	92.0	88.0
Ping Tong Long ...	China ...	6.6	15.0
Cipaye Blanc ...	Local ...	20.0	9.1
Lange Violette ...	Holland ...	88.0	85.0
Cipaye Narain ...	Local ...	75.7	85.7
Dingra	India ...	5.0	0.0

The disease ratings were converted into disease indices using the following formula:

$$\text{*Disease index} = \frac{\text{Sum of individual ratings} \times 100}{\text{Total number of plants (10)} \times \text{highest ratings (3)}}$$

Results shown in table 11.6 indicate that five varieties Cipaye blanc, L 17, Ping Tong Long, Dingra Multiple Purple and Florida highbush showed good disease resistance to Phomopsis blight. Varieties Black beauty, Rosita, Bonica F_1, Baluroi F_1, Lange Violette and Cipaye Narain showed high susceptibility to the disease.

11.3.3 *Laboratory work and screening of varieties under greenhouse conditions*

Phomopsis vexans produce numerous pycnidia on yeast extract agar (starch 10 g; mycological agar 20.0 g, yeast extract 3.0 g; 1000 ml. water). The inoculated flask containing the agar gave best pycnidial, when placed in light at room temperature. It was noted that the medium with 1.0 g of yeast extract produced only the conidia. When the amount of yeast extract was increased to 3.0 g both and —conidia were produced.

11.3.4. *Studies on inoculation techniques*

Five inoculation methods were worked out to assess the best technique that could be used for screening of resistance to *Phoomopsis* blight. Results of the reaction of six varieties of egg-plant to the various techniques were compared to those obtained under natural field infection. The one used by Kalda T. S. et al 1976, proved to be the best (Table 11.7). The fungus was cultured and multiplied on yeast-extract agar medium. For preparation of spore suspensions, mature pycnidia were crushed and diluted with distilled water to a reasonable density. The pycnidia were also multiplied on a sterilised medium containing sand and maize in the ratio of 9 : 1. The plants were inoculated at their fourth leaf stage with spore suspensions on the leaves using an atomiser and with the sand and maize culture on the soil around the plants.

TABLE 11.7

REACTIONS OF EGG-PLANT PLANT VARIETIES TO PHOMOPSIS VEXANS UNDER ARTIFICIAL AND NATURAL INOCULATIONS

Cultivars	*Disease Index*			
	Green-House reaction		*Field infection*	
	Leaf	*Stem*	*Leaf*	*Stem*
L 17	0	5	0	10
Cipaye blanc ...	0	0	20	10
Ping Tong Long ...	5	20	7	15
Black beauty ...	65	85	78	75
Cipaye Narain ...	77	91	76	86
Lange Violette ...	80	95	88	85

Disease indices were calculated using the following formula;

$$\text{Disease index} = \frac{\text{Sum of individual ratings} \times 100}{\text{Total No. of plants} \times \text{highest ratings}}$$

11.4 *Seed Pathology*—(J. BUCHA AND I. RAMDIN)

11.4.1. *Inspections of seed production crops*

Inspections were of two kinds:—

(a) Soil block inspections at Barkly Experiment Station and

(b) Field inspections

Almost 75% of the local seed crops are initially sown in soil blocks prior to distribution to Stations. Such an inspection could allow an early disease detection thus saving time and curtailing on travelling expenses. However, the results tend to indicate that the crops, sown in soil blocks, were too young for disease symptom expression at the time of distribution. The highly irregular stand of all soil block batches was very striking.

Fields under the following leguminous seed crops were inspected:— *Phaseolus vulgaris* (bean), *Pisum sativum* (pea), *Vicia faba* (bokla) and *Vigna unguiculata* (cowpea). Cultivars grown were: Long Tom, Noorinbee, Pioneer and Local Red for bean, Local and Chinese for pea, Local for bokla and Chinese for cowpea. Beans were planted at Richelieu, Barkly, Curepipe and Réduit Experiment Stations and at FUEL, Queen Victoria. Peas were sown at Plaisance and Pamplemousses Experiment Stations and at FUEL, Queen Victoria. Bokla was grown at Barkly and cowpea at Pamplemousses Experiment Station.

The disease status of all these crops was on the whole satisfactory. One field each of bean cv. Norinbee at Réduit was severely attacked by *Sclerotinia sclerotiorum* and anthracnose *(Colletotrichum lindemuthianum)* respectively. However it is to be noted that there are indications to tthe effect that anthracnose is no more a major probiem on locally produced bean seeds. Fields under bean cv. Long Tom at Richelieu had on an average 5-10% haloblight *(Pseudomonas phaseolicola)*, while another field of cultivar Noorinbee showed trace foliar symptoms of haloblight. Bean cv. Noorinbee is apparently highly tolerant to the haloblight pathogen. The present observation, regarding haloblight foliar symptoms, should be viewed with some concern. Adequate precautions with respect to proper agricultural practices should be exercised in all seed production fields, so as to prevent disease build up in the Noorinbee seed stock. Trace infection due to haloblight and *Sclerotium* sp. was observed on bean cultivar Long Tom at Curepipe and some 5% haloblight, recorded on Long Tom at FUEL, Queen Victoria.

The following crops were also examined in the fields:—*Allium porrum* (leek), *Arachis hypogaea* (groundnut), *Beta vulgaris* (beetroot), *Brassica chinensis* (brede de Chine), *Brassica oleraceae* var. *Capitata* (cabbage), *Brassica petsai* (petsai), *Capsicum annuum* var. *grossum* (sweet pepper), *Coriandrum sativum* (coriander), *Cucumis sativus* (cucumber), *Cucurbita maxima* (pumpkin), *Cucurbita pepo* (squash), *Lactuca sativa* (lettuce), *Lagenaria vulgaris* (calebasse), *Lycopersicon esculentum* (tomato), *Momordica charantia* (bitter gourd),*Raphanus sativus* (radish), and *Trichosanthes anguina* (snake gourd).

Diseases commonly recorded on the above crops were of low incidence and no economic importance. At Plaisance Experiment Station, drying up of edges of leaves of *Brassica chinensis* was observed. The cause could not be ascertained. About 2% browning of tips of *Coriandrum sativum* leaves was noted at Barkly Experiment Station and localized but severe attack due to *Alternaria* sp. occurred at Pamplemousses. All *Lactuca sativa* plantations suffered from localized soft rot (*Erwinia* spp.). Wilting and stunting of *Momordica charantia* (2%) and *Trichosanthes anguina* (5%) plants occurred, the cause of which could not be pinpointed. However, it would appear that seeds of *Trichosanthes anguina* were treated with mercuric chloride prior to sowing.

11.4.2. *Seed Health Testing*

Complementary to field inspections, health testing of harvested seeds was performed for the purpose of monitoring the residual incidence of fungal seed-borne diseases. On the basis of results obtained, seed treatment studies would be initiated with the view of promoting disease free seed production through proper recommended chemical seed treatment. The standard blotter technique was used on 200-seed samples. Results are shown in Table 11.8.

TABLE 11.8

HEALTH TEST PERFORMED ON LOCALLY PRODUCED SEEDS BY THE STANDARD BLOTTER METHOD—SAMPLE SIZE—200 SEEDS—INCUBATION AT ROOM TEMPERATURE, UNDER NUV/DARKNESS 12 HOURS ALTERNATED

Crops	*No. of batches processed*	*Organisms recorded (%)*							
		Fusarium spp.	*Alternaria* spp.	*Phoma* spp.	*Colletotrichum* spp.	*Myrothecium* spp.	*Cercospora* spp.	*Stemphylium* spp.	*Gloeosporium* spp.
Coriandrum sativum ...	5	0.5 to 36	19 — 46	0.5 to 14	Trace	Trace	7.5 to 8	1.5 to 3	Trace
							Verticillium spp.	*Cladosporium* spp.	
Brassica chinensis ...	11	1 to 14	11 to 54	0	0 to 6.5	0	2.5 to 56	50 to 95	0
									Drechslera spp.
Brassica petsai ...	3	Trace to 4	Trace to 27	—	—	—	—	100	Trace
Lycopersicon esculentum ...	6	2 to 7.5	0 to 6	Trace	0	Trace	Trace	0	Trace
Lactuca sativa	9	2 to 9	1 to 6	0	Trace	0	0	0	0
									Phomopsis vexans
Solanum melongena ...	6	Trace to 22.5	Trace	0	Trace	Trace	0	0	Trace to 11
Capsicum annuam var. *grossum*	7	2 to 42	0	0	0	Trace	0	0	0
Trichosanthes anguina ...	1	4	0	0	0	4	0	0	0
Allium sativum	6	0 to 2	Trace to 8	—	—	—	—	—	—
								Aspergillus spp.	*Macrophomina* spp.
Arachis hypogaea ...	2	0	0	0	0	0	0	0 to 100	0 to 4
Beta vulgaris	2	0 to 1	0 to 8	0	0	0	0	0	0
Brassica napus	6	Trace	0.5 to 4.5	0	0	0	0	0	0
							Alternaria brassicicola		
Brassica oleracea var. *botrytis*	1	2	0	0	0	0	6	0	0
Brassica oleracea var. *capitata*	1	0	0	0	0	0	2	0	0
Cucumis sativus ...	2	Trace	0	0	0	0	0	0	0
					Fusarium moniliforme				
Hibiscus esculentus ...	10	Trace	0	0	58 to 100	0	0	0	0
Luffa acutangula ...	6	1 to 6	0	0	0	0	0	0	0
Pisum sativum	4	Trace	0	0	0	0	0	0	0
Raphanus sativus ...	2	0	0 to 30	0 to 3.5	0	0	0	0	0

No fungal disease organism was found in the following crops:— *Amaranthus caudatus,* (2batches), *Cucumis melo,* (1 batch), *Cucurbita pepo,* (1 batch), *Lagenaria vulgaris,* (2 batches), *Psophocarpus tetragonolobus* (1 batch), *Solanum nigrum* (3 batches) and *Spinacia oleracea* (2 batches).

One sample each of *Phaseolus vulgaris* (bean) cv. Local Red and Victory, nine of Noorinbee and fifteen of Long Tom were examined. Standard blotter method showed no fungal pathogens in the Local Red Sample as well as in three Noorinbee and four Long Tom samples. Trace *Fusarium* spp. were detected in all the bean samples expect for the Victory, one Noorinbee and two Long Tom samples. The seedling symptoms test was performed using the Victory, two Noorinbee and three Long Tom samples. The haloblight pathogen. (Pseudomonas *phaseolicola*) was detected in all the samples (7 to 18%) except in one Noorinbee sample. *Sclerotium* spp. (2 to 3%) and *Rhizoctonia* spp. (3 to 6%) were also revealed in the three Long Tom samples by that test.

The crucifers generally-coriander, tomato, eggplant, chilly, okra and bean in view of their seed-borne disease status will be the object of seed treatment studies in 1981.

11.4.3 *Seed health of imported seeds*

The following seed samples imported by the Ministry were examined by the blotter method:— Tomato cvs Cal-J from Kenya; Pea—Pisum sativum cvs PKw Kelvedor Wonder and Meteor from U.S.A; Hot pepper (Capsicum annuum var. Longum) from Italy.

All the seed samples except for the hot pepper seeds were free of fungal pathogens. Results of health testing of the hot pepper seeds are given in Table 11.9.

TABLE 11.9

HEALTH TEST OF HOT PEPPER SEEDS PERFORMED BY THE BLOTTER METHOD—SAMPLES SIZE—200 SEEDS—INCUBATION AT ROOM TEMPERATURE, NUV/DARKNESS 12 HRS ALTERNATED

Organisms (Number recorded per 200 seeds)	*Chilly Cultivars*			
	Guillo grosso	*Peperose lossogrosso quadrats dolce*	*Friariecco peperone*	*Peperone Gorns diforo grosso longo dolce Rosso*
Fusarium moniliforme ...	4	—	—	—
Fusarium sp.	—	2	—	—
Curvularia sp.	8	—	—	—
Alternaria tenuis ...	3	4	—	1
Ascochyta capsici ...	—	26	—	2
Mycrothecium roridum ...	—	1	—	—
Chaetomium sp. ...	—	—	3	3
Pyrenochaeta sp. ...	—	—	—	2
% Germination 10 days after plating ...	81	70	2.5	8.0

Ascochyta capsici appears to be important on chillies in cold regions and *Pyrenochaeta* sp. isolated from chilly seeds hass been reported to attack tomato.

11.5 *Onion and Garlic*

Chemical control of Blast (Botrytis spp.*) and purple blotch (Alternaria porri) of onion* (M. Pillay and N. Sobun)

As a follow-up of field experiments conducted in 1979 and in which Dithane M-45 and Rovral proved superior to other fungicides tested, further trials were set up this year with a view to determining an economic measure of control of the two foliage diseases, affecting onion and garlic.

11.5.1 *Experimental*: Onion var. Red Creole

Three fungicide treatments: Dithane M-45, Rovral, a combination of both, and an unsprayed control were replicated three times in a complete randomised block design at Central Experiment Station (Reduit). Seedlings were transplanted to raised beds of 4′ by 12′ on 13th May and spaced 4″ in furrows 6″ apart.

Fungicides were applied at a pressure of 45 p.s.i. by means of a 'CP-3' knapsack sprayer on the following dates: 17th, 24th and 31st July; 8th, 16th, 21st and 28th August; 4th, 11th, 16th and 27th September; 4th and 11th October.

Disease severity was measured on 4th September in the following manner. The fourth leaf, starting from the emerging one, was plucked from 10 plants picked at random in the middle rows of each treatment plot. These leaves were placed in labelled plastic bags and brought to the laboratory where an absolute count of each type of lesion (Blast and purple blotch) was recorded.

Despite periodic application of insecticide Nuvacron to the spraying mixture, a severe thrips infestation was observed in the experimental plot as from the beginning of September. The infestation continued to spread, masking completely blast symptoms with which it can easily be confused. Incidence of the latter could not subsequently be recorded reliably.

Bulbs were lifted and trimmed on the 28th October. After discarding the border rows, bulbs obtained in the six remaining middle rows were weighed in the field.

Results and Discussion

The results were statistically analysed and a summary is given in Table 11.10.

The three treatments resulted in a significant reduction in disease-severity and a higher yield than control.

TABLE 11.10

DISEASE SEVERITY AND YIELD

Treatment and rate/litre	*Mean disease severity*		*Mean Yield (kg)*
	No. of lesions/leaf		
	Purple blotch	*Blast*	
Rovral 0.5 g	0.9	16.5	9.45
Dithane M/45 2 g ...	1.8	18.2	10.08
Rovral and Dithane M 45 0.5 g + 1 g resp. ...	1.8	17.8	9.83
Control	4.3	36.9	5.83
L. S. D. 5%	1.92	6.95	2.76

No significant difference could be detected among the treatments. Hence, regular preventive application of Dithane M/45 could continue to be recommended especially since it is cheaper and is already very familiar to the planting community, and widely available on the market.

11.5.2. *Experimental*: Variety-cum-Fungicide trial

A factorial design with four replications was used to compare the efficacy of weekly and fortnightly applications of Dithane M/45 in controlling Blast and Purple blotch in four onion varieties: Red Creole, Tropicana, Bon Accord and Hojem,at Richelieu Experiment Station.

Seedlings were transplanted on the 21st June to plots $7\frac{1}{2}$ by $3\frac{1}{2}$ ft and plants were spaced 4″ in rows 6″ apart.

Fungicides were applied from the 15th September to the 10th November. The spraying schedule was started only after the appearance of symptoms in the experimental plot. The whole plot had been inadvertently subjected to a treatment by Benlate on the 25th July.

Disease severity was scored by the same method as that described under Experiment I. The crop was harvested on 27 November.

Results and Discussion

The results were statistically analysed and presented in tabular form.

It is evident from table 11.11 that Dithane M/45, sprayed at both weekly and fortnightly intervals, significantly checked Purple blotch incidence on all of the four varieties tested.

TABLE 11.11

EFFECT OF 2 SPRAY INTERVALS OF DITHANE M/45 ON THE MEAN NUMBER OF PURPLE BLOTCH LESIONS OF 4 ONION VARIETIES

Treatments	*Mean Purple blotch lesions/variety*				*Mean*
	Tropicana	*Red Creole*	*Hojem*	*Bon Accord*	
Dithane M/45 (Weekly) ...	2.10	1.98	2.00	2.85	2.23
Dithane M/45 (Forthnightly) ...	3.03	2.85	3.65	3.60	3.28
Control	5.95	6.83	6.38	7.38	6.63
Mean	3.69	3.88	4.01	4.61	—

	S. Em±	*L.S.D. 5%*	*L.S.D. 1%*
Variety Mean ...	0.30	0.89	1.20
Purple blotch Mean ...	0.27	0.77	1.04
Variety X Purple blotch ...	0.54	1.55	2.09

However, only in the case of Hojem, there was a significant difference between the two spray frequencies.

Data from table 11.12 indicates that all four varieties responded equally well to Dithane M/45.

TABLE 11.12

EFFECT OF 2 SPRAY INTERVALS OF DITHANE M/45 ON THE MEAN NUMBER OF BLAST LESIONS OF 4 ONION VARIETIES

Treatments	*Mean Blast Lesions/Variety*				*Mean*
	Tropicana	*Red Creole*	*Hojem*	*Bon Accord*	
Dithane M/45 (Weekly) ...	7.75	10. 0	9.45	9.88	9.27
Dithane M/45 (Forthnightly) ...	10.48	10.75	11.88	12.00	11.28
Control	34.50	25.75	23.36	24.38	26.99
Mean	17.58	15.50	14.89	15.42	—

	S. Em±	*L.S.D. 5%*	*L.S.D. 1%*
Variety Mean ...	1.83	5.29	7.12
Blast Mean ...	1.58	4.58	6.17
Variety X Blast ...	3.17	9.16	12.33

There was no significant difference on Blast incidence between the two frequencies of fungicides application.

Table 11.13 showed that effective disease control through both weekly and fortnightly application of Dithane M/45 had a direct influence on yield in all four varieties.

TABLE 11.13

EFFECT OF 2SPRAY INTERVALS OF DITHANE M/45 ON THE YIELD OF 4 ONION VARIETIES

Treatments	*Mean Yield (kg)/Variety*				*Mean*
	Tropicana	*Red Creole*	*Hojem*	*Bon Accord*	
Dithane M/45 (Weekly) ...	9.44	7.80	17.90	9.40	11.14
Dithane M/45 (Forthnightly) ...	8.37	6.37	13.37	7.44	8.89
Control	6.00	5.00	9.37	4.75	6.28
Mean	7.94	6.39	13.55	7.19	—

	S. Em±	*L.S.D. 5%*	*L.S.D. 1%*
Fungicide Mean ...	0.48	1.39	1.89
Variety Mean ...	0.56	1.61	2.61
Fungicide X Variety ...	0.96	2.78	3.74

However, Hojem gave a significantly higher yield on weekly than fortnightly sprayings.

General conclusion

The newly introduced high-yielding varieties: Bon Accord, Hojem, Red Creole and Tropicana were all found susceptible to Blast and Purple Blotch under local conditions. However Dithane M/45 significantly reduced disease severity and finally achieved a higher yield than control. Although the fortnightly sprays also resulted in much better performance than control at Richelieu Experiment Station, it is doubtful whether that can be so under wetter conditions.

11.5.3. *Chemical control of purple blotch and blast of garlic* (M. Pillay and N. Sobun)

Experimental: Garlic var. Rodrigues

A randomised block design with 4 replicates was used at the Central Experiment Station at Réduit to compare the efficacy of four fungicide treatments and one unsprayed plot for the control of Blast and Purple Blotch on garlic var. Rodrigues.

Cloves, selected from the last year's crop were planted on raised beds of 4′ by 15′ and spaced at 4″ in furrows 6″ apart on the 23rd May.

Fungicides were applied on the following dates at a pressure of 45 p.s.i. by means of a CP-3 Knapsack sprayer: 17th, 24th, 31st July, 8th, 16th, 21st, 25th August; 4th, 11th, 16th, 27th September; 4th, 11th October.

Incidence of Blast and Purple Blotch was assessed on the 4th September by the same method as the one described for onion in Experiment I. The crop was harvested on the 5th November.

Results and Conclusion

The results on disease assessment and yield have been statistically analysed and are summarized in Table 11.14, below.

TABLE 11.14

DISEASE SEVERITY AND YIELD—GARLIC

Treatment and rate per litre	*Mean disease severity* — *No. of spot per leaf*		*Mean Yield (kg)*
	Purple Blotch	*Blast*	
Dithane M/45 at 2 g weekly ...	1.53	4.8	5.75
Dithane M/45 at 2 g fortnightly ...	3.33	13.88	5.13
Rovral at 0.5 g weekly ...	1.35	4.95	5.40
Rovral and Dithane M/45 0.25 g and 1 g resp. weekly ...	1.68	4.83	5.48
Control	7.25	25.38	4.95
L.S.D. 5%	2.03	2.84	0.95

All treatments were effective in controlling both diseases. There was slightly more infection in the fortnightly treatment with Dithane M/45 compared with the weekly frequency. However, there was little effect on yield.

It is to be noted, that a large part of the experimental plot was affected by high soil acidity.

11.6 *Bean*

11.6.1 *Identity of bacterial diseases and race typing of the halo blight organism* (S. P. Beni Madhu and S. Soomary)

Halo blight is one of the most important bacterial diseases of bean. As with many bacterial diseases, the pathogen responsible thrives well and causes serious damage in tropical regions like Mauritius where it has been observed that the disease often progresses to the point where the whole plant is destroyed. Aspects of research were directed mainly towards the detection, isolation, characterization and race typing of the halo blight pathogen.

11.6.2 *Pathogenicity tests*

Bean cultivars Victory and Long Tom were used for the tests. Seeds were sown in pots of sterile soil. Two seeds were sown per pot. The seeds took about four days to grow. Inoculations were performed as soon as the primary leaves opened. The 'water-soaking technique' described by Schuster (Phytopathology 45 p. 519) was tried. Ten plants were inoculated per isolate, and five kept as controls. The principle involved in the inoculation technique is to force the inoculum through the stomata into the leaves. The technique consisted of holding the leaf in the palm of the hand and forcing the bacterial suspension through the stomata of the lower side. A sprayon (jet pak) power unit was used for the purpose. A distance of three inches from the leaf surface proved satisfactory for water-soaking the leaves. Inoculations were done on primary leaves only. After inoculation, the pots were placed in trays containing water—and the plants were covered with transparent plastic bags for 48 hours. Readings were taken 8-12 days after inoculation.

Only isolates, producing the typical halo blight symptoms were kept and coded. The symptoms obtained were pale green, water-soaked lesions, developing into small halos with pinpoint brown spots in the centres. Thus, only seven isolates were kept and coded as PP_1; PP_2; PP_4; PP_7; PP_9; PP_{10}; PP_{12}.

11.6.3 *Characterization of the isolates*

The isolates were characterized as belonging to the genus *Pseudomonas* through morphological and biochemical characteristics. All were gram negative, all produced glistening creamy white growth on potato plants at 28°C. All were catalase positive, with isolate PP_9 and PP_{10} showing a weak positive reaction while others produced gas rapidly. No isolate produced H_2S, ammonia or indole. Gelatin was slightly hydrolysed while there was no hydrolysis of starch by any isolate. Hydrolysis of Tween 80 was positive. All reduced nitrate to nitrite. No isolates oxidised gluconate (no orange suspension obtained). Acid was produced by all isolates from glucose, fructose, sucrose, mannitol, dulcitol, maltose and lactose.

11.6.4 *Physiological races of the causal organisms*

Walker and Patel (1964), showed that resistance to halo blight in bean *(Phaseolus vulgaris)* was inherited as a monogenic dominant character in the cultivar Red Mexican U. 1. No. 3 by using isolates of *Pseudomonas phaseolicola* from several parts of the world. Isolates giving a susceptible reaction on Red Mexican were assigned to race 2. Those not giving a susceptible reaction were assigned to race 1.

The local isolates were inoculated on Red Mexican according to the method of Epton & Deveral (1965)* to determine their races. Seeds were obtained from Mr. J. Katherman, Cornell University, U.S.A. Isolates were cultured on King's Medium B for 24-48h at 28°C and the inoculum for inoculations prepared by suspending the bacteria in sterile water. The 'water soaking' technique was used using a Sprayer power unit. The primary leaves

were inoculated on the 6th day after sowing. Five plants were inoculated per isolate and two plants inoculated with sterile water served as controls. Control plants remained healthy throughout the experiment Results of other test plants are shown in Table 11.15.

TABLE 11.15

RACE TYPING OF HALO BLIGHT ISOLATES

Isolate No.	*Disease reaction on Red Mexican*	*Race*
PP_1 ...	No reaction — resistant	1
PP_2 ...	No reaction — (slight browning) resistant	
PP_4 ...	No reaction — resistant	1
PP_7 ...	No reaction — resistant	1
PP_9 ...	No reaction — resistant	1
PP_{10} ...	No reaction — resistant	1
PP_{12} ...	No reaction — resistant	1

*Epton, H.A.S & B. J. Deverall (1965) Physiological races of *Pseudomonas phaseolicola* causing halo blight of bean. Plant Pathology *114* (2): 53–54

All the isolates tested so far belong to race 1 as none gave a susceptible reaction. Further experiments using a large number of isolates collected throughout the island are envisaged.

11.6.5 *Halo blight on cultivar Noorinbee*

Tests were performed to test the resistance of cultivar Noorinbee against halo blight. Greenhouse inoculation experiments by the water-soaking technique were not successful on Noorinbee plants. Field observational trials in which cultivar Noorinbee was planted together with susceptible cultivars Long Tom and Local Red was performed. The disease incidence on Long Tom and Local Red was high. No foliar symptoms were observed on Noorinbee, however halo blight lesions were observed on pods of some plants. Isolations from the infected pods were proved to be *Pseudomonas phaseolicola* through successful inoculations on Long Tom plants. Inoculations on Noorinbee plants were negative. Isolations from leaves of Noorinbee plants. bearing infected pods, proved unsuccessful, thus eliminating doubts that the plants were symptomless carriers of the disease. How the pods got infected is yet to be determined.

11.6.6 *Fungal disease in beans (Sclerotinia mould)* — (M. Pillay and N. Sobun)

A severe outbreak of *Sclerotinia sclerotiorum* occurred in Central Experiment Station Reduit in April/May. The disease was observed in variety 'Pioneer' in a field experiment of Horticulture Division. It was then reported in a similar experiment at Plaisance Experiment Station where vars. Long Tom, Victory, Pioneer & Noorinbee were indiscriminately affected. Subsequently, it assumed epidemic proportions in 0.2 hectare field under var. Noorinbee destined for seed production. The attack which occurred at blossom-stage rapidily spread throughout the field in a matter of days and the ground became covered by a multitude of sclerotia formed on pods and other plant parts which had decayed. The whole plantation was uprooted and destroyed by fire. Since then localized attacks have been observed at Quatre Bornes, Vacoas and other parts of Central Experiment Station Reduit.

11.7 *Crucifers*

11.7.1 *Black rot of crucifers* (S. P. BeniMadhu & S. Soomary)

Black rot caused by *Xanthomonas campestris* is one of the most important bacterial disease of crucifer crops, attacking all cultivated brassicas and numerous cruciferous weeds.

Aspects of research were mainly on collection of isolates and control of the disease through screening of newly introduced crucifer cultivars, and through seed treatments.

Control of black rot through seed treatments

The black rot organism is known to be seed-borne and epiphytotics arise from diseased seeds. The standard treatment for eradicating the pathogen from seeds has been a hot water treatment at 50°C for 20-30 minutes. However it is known that this heat treatment has a bad effect on germination of seeds and seedling vigor. Thus alternative seed treatments are needed. One such treatment described by Humaydan et al (1980)* was tried in the greenhouse, with a slight modification—the seeds used in the experiments were inoculated with *Xanthomonas campestris,* by soaking them in a bacterial suspension for one hour and then dried, while the authors used naturally infected seeds for their experiments. The experiment consisted of inoculating the seeds (here, cauliflower snowball X (snowdrift) from Ferry Morse Seed Co.) with the black rot organism; then after drying, the seeds were soaked in a solution of antibiotic, then rinsed in water, before finally being soaked in sodium hypochlorite. The seeds were dried and then sown.

* (Humaydan et al (1980) Eradication of Xanthomonas campestris from brassica seeds with antibiotics and sodium hypochlorite. Phytopathology 70: 127-131).

The antibiotics tried were:—

(a) Vancomycin sulphate or Lilly Laboratories (Potency 1091 mcg per mg) Lot No. 9RR60. 500 mg/litre of water was tried.

(b) Streptomycin sulphate of 1 CN Pharmacenticals. 500 mg/litre tried.

(c) Tetracycline HC1 of Nutritional Biochemicals Corporation (Potency 980 mg/gm). 500 mg/litre tried.

The experiment was repeated twice. Each treatment consisted of three 100-seed replicates. The seeds were sown in wooden boxes containing sterilized soil. Seedlings were observed for the development of black rot symptoms. Eleven days after sowing, counts were made of seedling emergence and also the number of seedlings showing antibiotic-induced injuries, such as chlorosis, stunting and deformation. Seedling vigor was rated on a scale of 1 to4, in which 1 and 4 represents the lowest and highest vigor, respectively. Black rot symptoms consisted of characteristic yellow lesions with black .veins Counts for disease symptoms were made one week after definite symptoms of black rot were observed. Results are shown in Table 11.16.

TABLE 11.16

EFFECT OF VARIOUS TREATMENTS ON CAULIFLOWER SEED

Treatment	*Germination (%)*	*Injured Seedlings (%)*	*Seedlin vigor*	*Visible black rot infection*
HWT	75	0	3	−ve
Vancomycin/NaOCl ...	86	0	4	−ve
Streptomycin/NaOCl ...	85	0	4	−ve
Tetracycline/NaOCl ...	80	3.5	4	−ve
Control (inoculated seeds) ...	71	0	2	+ve

From results obtained, the treatments Vancomycin/NaOCl and streptomycin/NaOCl were more effective. The hot water treatment gave good control of the disease, but had a bad effect on germination of seeds and seedlings vigor.

11.7.2. *Greenhouse screening of crucifer crops against the black rot disease*

Two inoculation methods, Spray method and Notch inoculation, were tried in the greenhouse. In both cases, isolate XC_1 which is pathogenic on cauliflower, cabbage and kohlrabi was used. Inoculations were performed with washed suspensions of the bacteria in sterile water. The spray method consisted mainly of spraying the leaves of the plants with the bacterial suspension using a Sprayon Power Unit. The plants were kept in a humid chamber, prior to inoculation. The spray method was performed twice. 10 plants were sprayed with bacterial suspension and three controls with sterile water in each case. Results in the table show an average of the two experiments. Notch inoculation consisted of inoculating the plants with suspensions of bacteria by cutting with a razor blade about 2 mm. v-shaped portions of the marginal hydathode regions under the bacterial suspension. Here again, ten plants were inoculated with bacterial suspension and three controls with sterile water. Results of inoculations are shown in Table 11.17.

TABLE 11.17

SCREENING OF CRUCIFER CROPS AGAINST THE BLACK ROT DISEASE

No.	*Cultivar*	*Origin*	*Percentage of infected plants*	
			Spray method	*Notch Inolulation*
1	Cauliflower Snowball X (snowdrift)	Ferry Morse, California, Seeds obtained from Min. of Social Security	55	60
2	Cauliflower Snowball Y	Ferry Morse, California, Seeds obtained from Min. of Social Security	65	70
3	Cauliflower March Early St. Valentine	Ferry Morse, California, Seeds obtained from Min. of Social Security	70	70
4	Cabbage Charleston Large Wakefield Y. R.	Ferry Morse, California, Seeds obtained from Min. of Social Security	65	70
5	Cabbage 632 Spring light	Seeds from Agricultural Div.	50	60
6	Cabbage 633 Summer Autumn	Seeds from Agricultural Div.	60	70
7	Cauliflower Farmers Early No. 2	Seeds from Agricultural Div.	55	60
8	Cauliflower Farmers Early No, 3	Seeds from Agricultural Div.	60	80
9	Kohlrabi Knolkool (Purple Vienna)	Seeds from Local Market	75	80
10	Kohlrabi Knolkool (White Vienna)	Seeds from Local Market	75	80

All the cultivars proved susceptible, and higher disease incidence was obtained when Notch inoculation was performed.

11.8 *Investigations on soft rot diseases* (S. P. Beni Madhu and S. Soomary)

11.8.1. *Detection and identification of soft rot organisms*

The causal organisms, causing soft rot of lettuce, ginger, garlic, cabbage, cauliflower and pumpkin were isolated and coded.

After pathogenicity of the isolates has been proved, their characterization as *Erwinia carotovora* var. *carotovora* was performed through biochemical tests. The origin of the bacterial cultures studied here are listed in Table 11.18.

TABLE 11.18

BACTERIAL CULTURES OF ERWINIA SHOWING THEIR HOSTS AND NUMBER OF CULTURES RETAINED AND STORED

No.	*Plant hosts*	*Localities*	*Code*	*No. of cultures*	*Name of Pathogen*
1	Potato tubers	Union Park	E_1, E_2, E_9	3	Erwinia carotovora var. carotovora
2	Black leg lesions on potato stem	Union Park	E_3, E_4	2	Erwinia carotovora var. atroseptica
3	Onion bulb	Richelieu	E_5, E_6, E_{12} E_{19}	4	Erwinia carotovora var. carotovora
4	Beet root	Réduit	E_{10}, E_{16}	2	Erwinia carotovora var. carotovora
5	Lettuce	Curepipe	E_{11}	1	Erwinia carotovora var. carotovora
6	Ginger	Réduit	E_{13}	1	Erwinia carotovora
		Nouvelle France	E_{14}	1	var. carotovora
7	Cabbage	Curepipe	E_{18}, E_{29} E_{30}, E_{31}	4	Erwinia carotovora var. carotovora
8	Cauliflower	Réduit	E_{26}, E_{27}	2	Erwinia carotovora var. carotovora
9	Pumpkin	Curepipe	E_{25}	1	Erwinia carotovora var. carotovora

Physiological differences between the isolates were shown in tests in the greenhouse. Inoculations in potato stems wer performed. Only isolates E_3 and E_4 produced black leg lesions.

Temperature relation studies revealed that all the isolates, with the exceptions of isolates E_3 and E_4, did grow at 37°C on solid or liquid media. Isolates E_3 and E_4 produced only few tiny and discrete colonies.

11.8.2. *Comparative studies on the pathogenic properties of Erwinia carotovora var. atroseptica (isolate E_3) and Erwinia carotovora var. carotovora (isolate E_9) in relation with temperature*

The method, used for the experiment, was the one described by M. Caron et al (1978). The cultures of the isolates were stored in the refrigerator on slants in tubes of medium B of King and were removed at about 20 hours before inoculation of tubes of nutrient broth (10 ml) using a platinum wire. The tubes were shaken for 30 seconds, and were incubated for 24 hours at 24°C and 28°C.

Five vegetables were used—carrots, brinjal,beetroot, potato, and tomato. They were washed in water, then sterilized in sodium hypochlorite (6%) for 20 seconds. Slices about 5 mm. were cut aseptically and placed in petri dishes, containing filter papers and 10 ml of sterile water. There were five replicates in each case. The slices were inoculated by placing in their centres with the help of a sterile syringe (1 c.c. gillette) a drop of 0.1 ml of the bacterial cultures, kept at 24°C and 28°C. Controls received 0.1 ml of sterile nutrient broth. After inoculation, the slices were kept at 24°C and 28°C.

Observations were made after 24 and 48 hours of incubation. To check state of slices, a sterile needle was plunged into each of the slices. The state of the slices was evaluated through the following ratings:—

Total absence of rot (−)

Slight softening of slice at centre of inoculation (+)

75% of surface tissues softened (++)

Soft rot from 50 to 90% of slice (+++)

10% or less of slice without rot (++++)

complete soft rot of the slice (+++++)

Results are shown in Table 11.19.

T

PATHOGENICITY OF E. ATROSEPTICA AND E. CAROTO

	E. atroseptica							
	inoculum at 24°C				*inoculum at 28°C*			
	Slices at 24°C		*Slices at 28°C*		*Slices at 24°C*		*Slices at*	
	24h	*48h*	*24h*	*48h*	*24h*	*48h*	*24h*	
Carrots	—	++	—	+++	—	+	—	
Beet root	—	+	—	++	—	—	—	+
Brinjal	+++	++++	—	+	++	+++	+	+
Potato	++++	+++++	++++	+++++	+++	+++++	+	+
Tomato	+++	++++	+++	+++	++	+++	+	+

*(M. Cavon R.O. Lachance et M.L. Kanfmann (1978). Pathogenicité d'*Erwinia carotovo*
Phytoprotection *59:* 142–148)

ETABLES AT DIFFERENT TEMPERATURES

E. carotovora						
inoculum at 24°C			*inoculum at 28°C*			
es at 24°C	*Slices at 28°C*		*Slices at 24°C*		*Slices at 28°C*	
48h	*24h*	*48h*	*24h*	*48h*	*24h*	*48h*
++++	+++	++++	++++	+++++	++++	+++++
+++	++	+++	+++	++++	+++	++++
+++++	++++	+++++	++++	++++	+++	+++
+++++	+++++	+++++	+++	+++++	++++	+++++
++++	++++	+++++	++++	++++	+++++	+++++

a et d'*Erwinia carotovora* var. *carotovora* sur différents légumes en relation avec la température.

From results obtained, the following conclusions were reached at:—

(a) *Erwinia carotovora* var. *carotovora* produces a soft rot more quickly than *Erwinia carotovora* var. *atroseptica.*

(b) Inoculums of both isolates kept at 24°C before inoculations proved more aggressive than those kept at 28°C.

(c) Incubation temperature of the slices had some influence on the activity of *Erwinia carotovora* var. *atroseptica* but did not have any such influence on *Erwinia carotovora* var. *carotovora.*

(d) An incubation of 48 hours of the slices proved enough to show the activity of both organisms.

11.9. *Chilly*

Investigation on virus diseases—(I. Dossa and R. Mungur)

It has been shown that leaf mottling and distortion in *Capsicum annuum* is caused by potato virus Y, which is transmitted by the aphid *Myzus persicae.* The present study is aimed at understanding the field spread of the disease and the effect of the virus on the yield of two cultivars of *C. annuum.*

11.9.1. *Determination of Vector (Myzus persicae)—Virus (Potato Virus Y) relationship.*

Determination of acquisition threshold

All aphids were reared in cages in the greenhouse and were adult, non-infective, apterous aphids. A first batch of aphids were fasted for two hours and given an acquisition feeding time of 5, 10, 20, 25 and 30 seconds after which they were placed on healthy *C. annuum* seedlings and allowed to feed for two hours. They were then killed with the insecticide omethoate. A second batch was fasted for two hours and allowed to acquire naturally the virus from the infected plant, i.e. the acquisition time was not artificially terminated. The aphids were then transferred to healthy *C. annuum seedlings and killed* after two hours (as above).

Results and conclusions

TABLE 11.20

ACQUISITION THRESHOLD DETERMINATION

Acquisition feeding (Secs)	*No. of plants on which aphids were fed*	*No. of plants showing symptoms of leaf distortion*	*Percentage of infection (%)*
5	30	16	53.3
10	30	18	60.0
15	30	23	76.6
20	30	24	80.0
25	30	24	80.0
30	30	23	76.6
Naturally terminated feeding	30	24	80.0

Potato Virus Y is a non-persistent virus and is transmitted by the aphid, *M. persicae*. The virus is very rapidly acquired by the insect—within 5 secs (Table 11.20 above) and this would explain the rapidity of the field spread of the disease. An increase in the acquisition feeding beyond 20 seconds did not produce an increase in infection.

11.9.2. *Determination of inoculation threshold*

The aphids were given a fasting time of 2 hours and allowed to naturally acquire the virus from a PVY infected plant, i.e. the acquisition time was not artificially terminated. The aphids were then transferred to healthy seedlings and allowed to infect the same for different intervals of time i.e. 5, 10, 15, 60 secs, 30 mins, 1, 2, 3, hours. 3 plants were infected using 5 aphids per plant.

Results and conclusions

TABLE 11.21

INOCULATION THRESHOLD DETERMINATION FOR M. PERSICAE

Inoculation Time	*No. of plants on which aphids were fed*	*No. of plants showing symptoms of leaf deformation*	*Percentage infection (%)*
5 secs ...	30	11	36.6
10 secs ...	30	18	60.0
15 secs ...	30	20	66.6
60 secs ...	30	24	80.0
30 mins ...	30	23	76.6
1 hr ...	30	24	80.0
2 hrs ...	30	24	80.0
3 hrs ...	30	26	86.6

From the above table, it is evident that a maximum percentage of infection is attained when the aphids are fed for 60 seconds on healthy seedlings. A greater inoculation time (1, 2, 3hrs) did not cause a significant increase in infection.

11.9.3. *Effect of Potato Virus Y (PVY) on yield of two cultivars of Capsicum annuum L.*

This experiment was carried out at Central Experiment Station on cultivars Chinese Giant and Dunputh and was laid out in a four replicate split plot design. A non necrotic strain of PVY, originally obtained from an infected plant of*C. annuum* cv. Chinese Giant, was used.

Inoculum

This was prepared by extracting the sap of infected leaves of *C. annuum* in 0.1 M Phosphate buffer pH 7.0. To the inoculum, the abrasive carborundum mesh 600 was added. The first inoculation was made 10 days after transplanting the seedlings on the field. The second inoculum was made one month later. In both cases, the infectious sap was diluted 1:5 with phosphate buffer and then rubbed over the surface of the leaves.

Results and conclusions

From the table below, it is evident that infection with PVY significantly reduced the yield and the number of fruits in both cultivars.

TABLE 11.22

COMPARISON OF NUMBER AND YIELD OF FRUITS FROM TWO PVY SUSCEPTIBLE C. ANNUUM CULTIVARS

Cultivars	*Mean Yield* (kgs)*	*Mean No. of fruits/plant**
Chinese Giant Inoculated ...	5.94	14
Chinese Giant Uninoculated ...	12.94	24
Dunputh Inoculated ...	9.76	10
Dunputh Unioculated ...	16.50	27
L.S.D. 5% : 4.55 1% : 6.54	L.S.D. 5% : 4.28 1% : 6.14	

*Average of four replicates

(i) All the plants, that were inoculated earlier, failed to produce any fruit due to the death of the plants prior to flowering. This was probably due to the effect of the inoculum size on the young seedlings.

(ii) The late inoculations significantly reduced the yield and number of fruits of the two cultivars, when compared with their respective (uninoculated) controls. The effect of the virus infection was a reduction of the total number of fruits formed as well as fruit malformation. Clearly, the loss is important and control measures are called for. Although, ideally, the best measure would be to have a variety, which is resistant to our strains of PVY, weekly sprays of an appropriate systemic insecticide would help reduce the extent of damage.

11.10 *Tobacco*

11.10.1 *Assessment of resistance to and survey for virus diseases*—

(I. Dossa and R. Mungur)

11.10.1.1 *Assessment of resistance to the necrotic strain of Potato Virus Y*

The following flue cured varieties were tested in 10 replicates: Speight G41, Virgina 115 and Nordell. All the plants were mechanically inoculated under greenhouse conditions. The inoculum was prepared in 0.1 M phosphate buffer pH 7.0. All the three varieties were susceptible to the virus infection and showed symptoms of veinal necrosis. Additionally, Speight G41 and Virgina 115 showed necrotic streaks along the stem.

11.10.1.2 *Assessment of resistance to Tobacco Mosaic Virus (TMV)*

Varieties Speight G41, Virgina 115 and Nordell were tested for resistance to TMV using same method as above. The 3 varieties were susceptible and developed a mosaic pattern.

11.10.1.3 *Disease assessment*

A disease assessment was carried out on vars. NC 95, SC 66, Speight G 28, Coker 347, Virgina 115, Coker 86 and Speight G 41. These vars. were under a field trial set up by the Agronomy Division and were laid out in a randomized complete block design with 4 replicates. No cases of veinal necrosis were recorded. Two cases of mosaic on var. Virgina 115 were identified as tobacco mosaic virus; a single case of cucumber mosaic virus was seen on var Coker 86.

11.10.1.4 *Survey of virus diseases*

A survey of virus diseases of tobacco was undertaken during the first and second planting seasons, in collaboration with inspectors of the Tobacco Board. Weather Fleck and veinal necrosis were unusually severe during the first season on var. NC 95 at Terre Rouge, Morcellement St. André, Notre Dame, Cottage and Isle d'Ambre. Few cases of TMV were recorded. Various fields, where air-cured var. Amarello was grown (Le Ravin and Roche-Noire), were inspected and found to be free from virus diseases.

During the second planting season, relatively few cases of virus diseases were encountered. Weather fleck was mild and confined mostly to Terre Rouge and Morcellement St. André. At Terre Rouge, symptoms of phytotoxicity were seen on var. NC 95 in a single plantation.

11.10.2 *Assessment of resistance in tobacco varieties to the rootknot nematode M. javanica*—(N. Yerrigadoo and M. Chinappen)

Two assessments for rootknot nematode *(Meloidogyne javanica)* were performed on Tobacco, in two seasons of Variety Trials conducted by the Agronomy Division in two different fields at Richelieu Experiment Station. Seven varieties were replicated four times on both seasons in randomized block pattern. End of season scorings were performed on twentyfive plants of five effective lines, which were uprooted and given ratings for root galling *(Meloidogyne spp.),* according to the Rating system modified and adopted by Zeck 1971. (Zeck, N.M. (1971) Pflanzenschutz—Nachrichten Bayer 24: 141—144.

TABLE 11.23

RESISTANCE OF SEVEN TOBACCO VARIETIES TO MELOIDOGNE JAVANICA

Variety		*Mean Disease Index 1st Season*	*Mean Disease Index 2nd Season*
Virgina 115	...	61.12	22.30
Coker 347	...	22.90	24.40
N.C. 95	...	11.50	17.70
Coker 86	...	13.37	31.90
Speight-41	...	10.62	15.80
Speight 28	...	19.00	17.90
S.C. 66	...	11.50	17.30
L.S.D. 0.05	...	11.62	20.96

Results are shown in Table 11.23. All varieties appear to be tolerant to the root-knot nematode with the exception of Virgina 115, during the 1st season and Coker 86 during the 2nd season.

11.10.3 *Chemical control of damping-off of Tobacco* (M. Chinappen and T. Rawananshah)

Two trials were conducted at Richelieu Experiment Station to evaluate four chemicals for their control of damping off of tobacco var. NC 95. The treatment beds were 10ft by 4ft, arranged in a complete randomised block design with four replications. Seeds were treated with silver nitrate (0.1%), prior to sowing. Recommended fertilizers and insecticides were used. An equal amount of seeds were sown on each bed (0.4 cc/ bed) on May 15, 1980 and on September 24, 1980. Vapam and Bunema were applied two weeks before sowing. Treatments Ridomil 5G and Ridomil 25 WP were done at sowing. Four picklings were effected in each plot, the number of usuable transplants, showing no lesions, were counted.

1st Expt. Vapam gave more usuable transplants than other treatments. Disease incidence was low owing to dry weather conditions, prevailing during that season.

2nd Expt. Vapam proved again to be better than the other chemicals. Disease incidence was low, which accounts for the rather high number usable transplants from the control beds. Results are shown in Table 11.24 below.

TABLE 11.24

EFFECT OF VARIOUS TREATMENTS ON TOBACCO SEEDBEDS

Treatments and rate of product	*Average number of usuable transplants per bed (showing no lesions)*	
	1st Expt.	*2nd Expt.*
Vapam† — 400cc/bed	857[a]*	7400[a]
Ridomil 5G — 15 gm/bed ...	257[b]	4510[a]
Ridomil 25 WP — 6 gm/litre/bed ...	214[b]	5780[a]
Ridomil 25 WP/captan 10 gm/litre/bed	184[b]	—
Bunema 500 cc/bed	—	5010[ab]
Control	101[c]	2870[ab]

* The small letter indicates Duncan Multiple range groupings which do not differ significantly at the 5 per cent level.

† Vapam — Sodium N — hydroxymetyl — N — metyldithiocarbamate Ridomil — N — (2, 6 — dimetylphenyl) —N — (methoxyacetyl) alanine metylester
Bunema — potassium N — hydroxymetyl — N — methyl dithiocarbamate

11.11 *Ginger — Zingiber officinale* — (M. Pillay and N. Sobun)

11.11.1 A rot of rhizomes, accompanied by general stunting and yellowing of plants reported to be a major source of despair to traditional ginger growers, was investigated.

The disease was most destructive, killing large patches of plants in the field. Unlike bacterial soft-rot, whose distribution is limited to low-lying areas, following heavy rains, it occurred on steep mountain-side as well as on flat ground even during relatively dry spells.

Several fields in Les Mariannes, Robinson, Creve-Coeur and Long mountain were covered in a survey, during which diseased material and soil samples could be collected for laboratory work.

From preliminary studies, there are good indications that the problem is of nematode origin. In fact large numbers of egg masses of a *Meloidogyne* sp. (subsequently identified by the Commonwealth Institute of Helminthology as *M. iavanica*) were obtained from deep inside root tissues and from rhizomes.

It is likely that continuous cropping by ginger in the same fields for decades has led to such a build-up of nematode population that ginger can no longer be profitably grown in those areas in the absence of appropriate chemical control measures in the first instance. Further work in this direction may have have to be contemplated in the near future.

It was evident during the survey and also from Extension sources that the old leaf-blight problem has diminished in importance and is under control as a result of our recommendations on chemical control.

11.12 *Potato* — (M. Pillay and I. Dossa)

11.12.1 Following complaints from small potato growers, it was decided that we should carry out a survey in order to determine the cause of such complaints, although responsibility for research on that crop rested primarily with the Mauritius Sugar Industry Research Institute which is also responsible for the certification of local seeds.

Fields in the North, West and Centre of the island were visited almost every week in July and August and disease incidence could be recorded at the critical periods of their manifestation in the growth cycle of the crop. Despite the fact that potao was subjected to a generalized unprecedented attack by the leaf-miner *Lyrlomyza trifolii* this year, it pretty soon became obvious that the latter was, especially towards the end of the crop cycle, masking symptoms of viral infection attributable to Potato Virus Y in stands grown from locally produced Up-to-Date seeds. Incidence of PVY was as high at 50% in certain fields. Plants showed symptoms of stunting, necrosis of veins on the lower side of leaves, leaf wrinkling and some necrosis along the stem. Differential host plant reactions and serological tests almost invariably revealed the presence of Potato Virus Y together with Potato Virus X, the causal agent of rugose mosaic. Potato Virus Y alone was recorded in a few cases.

11.12.2 *Performance Test*

Samples of both locally produced and imported Up-to-Date seeds (provided by the Agricultural Marketing Board) were planted at Central Experiment Station Reduit on 22 July in a simple experiment to compare performance of the two batches of seed potato.

Two hundred tubers of each batch were planted whole and another one hundred of each were cut, dipped in Benlate and allowed to suberize, prior to planting, in an attempt to simulate roughly planters' practice. There were, therefore, five rows of forty plants of each category (whole and cut local; whole and cut Imported).

But the 26th August, 55% of the plants from local seeds were displaying clear symptoms of PVY. A couple of plants were affected by leaf-roll in both cases. The details are given in Table 11.25. below.

TABLE 11.25

INCIDENCE OF PVY IN LOCAL AND IMPORTED UP-TO-DATE

Variety	*No. of plants showing symptoms of PVY in each row of 40 plants*					*% plants displaying symptoms of infection of PVY*
Local Cut ...	25	23	23	20	19	55
Local Whole ...	22	21	20	24	22	54.5
Imported Cut ...	0	0	0	0	0	0
Imported Whole ...	0	0	0	0	0	0

It was observed that virus infected plants were particularly sensitive to leaf miner attack (and that too, much earlier in the crop cycle) compared to healthy plants of both Local and Imported Up-to-Date. Insecticide Tamaron had been applied every week.

11.12.3 Scab incidence was very high in local Up-to-Date.

11.13 *Citrus* — (I. Dossa and M. Mungar)

11.13.1 A severe starin of tristeza was seen for the first time at Belle Vue Experiment Station on five out of three hundred rootstocks of Rangpur lime, tested for the presence of "stem-pitting" symptoms. No cases of triteza was recorded from the citrus plants at Palmar Experiment Station.

11.13.2 Indexation for greening disease has been tried by the chromatographic determination of gentisoyl glucose from specimens taken from Plaisance Experiment Station, Central Experiment Station, Palmar Experiment Station and Belle-Vue Experimental Station. The findings were erratic and inconclusive, probably due to a lack of pure gentisoyl glugose to serve as control.

11.14 *Ornamentals*

11.14.1 *Investigation on diseases of Anthurium — (Anthurium andreanum* — M. Pillay & N. Sobun)

Diseased plant material, encountered during active growth inspections of Nurseries, which arre engaged in the exportation of fresh cut-flowers, were studied in the laboratory throughout the year. From our observations, it would appear that Anthracnose is the major pathological problem, affecting Anthuriums in Mauritius. The disease occurred mainly on leaves but also, to a lesser extent, on floral parts. Young plants were more seriously attacked in those nurseries, where preventive applcation of fungicide was not practiced on a regular basis. Meristem-derived plants, imported from Holland, appeared more susceptible and several cases of complete loss of plants have been recorded. Fungal cultures and specimens were forwarded to the Commonwealth Mycological Institute for identification. The *Collelotrichum* and *Gloesporium* stages of *Glomerella cingulate* seem to be the casual agents.

Phoma herbarum, also identified by CMI, was obtained from consignments of meristem plantlets, imported from Holland on phytosanitary inspection at Reduit, prior to release to importers.

11.14.2 *Bud rot of Palm* — (S. P. Beni Madhu & N. Soomary)

Palm cabbages, becoming an important export product, a survey of palm plantations (mainly white palms) was effected throughout the island. No cases of bud rot were observed. However, at Riche en Eau, several cases of bud rot were observed on "Latanier", (Lantania spp). But it was impossible to detect the causal organism due to the advanced state of putrefaction of the cabbages of the infected plants.

Inoculations in the greenhouse of various hosts were performed. Positive reactions were observed on maize plants, broom bamboo grass *(Thysanolaena* sp.), Elephant grass *(Pennisetum spp.),* Job's tears *(Coix lacrimajobi)* and white palm. Confirmation of the reisolates from these hosts as *Xanthomonas vasculorum* were done through inoculations into sugar-cane blades of variety M 337/56. Definite and characteristic gumming stripes were obtained in all cases.

Greenhouse experiments to determine mode of infection of palms showed that infection occurred only when the plant's stem around the growth region are pierced with a sterile dissecting needle and a small quantity of bacterial suspension is injected with a hypodermic syringe. Inoculations through spraying of bacterial suspension on plants, soil infestation with bacteria and root wounds failed.

11.15 *Plant Protection Service*

11.15.1 *Imports and exports*

During the year, 915 plant import permits were issued for the importation of fruits, potatoes, onion, maize, garlic, and a wide range of vegetable seeds and various plants. Commercial exports consisted mainly of cut anthurium flowers, anthurium plants, palm cabbages, melons and gingers. Non-commercial exports consisted mainly of tropical fruits, (mango, litches, pine-apple etc.), ornamental plants (palms, anthurium and orchids etc.) green spices, vegetables and flowers. 2675 phytosanitary certificates were issued during the year, 1086 of which were for commercial exports. On 36 occasions, inspection at premises had to be carried out. Active growth inspections at monthly intervals were effected at 26 Anthurium nurseries, growing cut flowers, to ensure disease and insect-free flowers for export. On several occasions, Anthurium plantlets from meristem culture were imported from the Netherlands and Hawaii by the local planters; during post quarantine visits, their evolution was watched closely and general recommendations were given to keep diseases and pests under check. Plantlets from the Netherlands seem to be faring quite well and have reached flowering stage.

11.15.2 *Control at Ports of entry*

Officers, performing plant and animal quarantine duties at Plaisance airport and Port Louis harbour, exercised phytosanitary control during the arrivals of 3813 planes and 279 ships. 920 items, mostly plant materials, were intercepted and destroyed due to either lack of proper documents or presence of harmful organisms. 394 landing permits were issued for frozen meat products. 2181 inspections of agricultural produce were made at harbour quays and in airport warehouses. Fees, collected in respect of inspection of agricultural produce, issue of phytosanitary certificates and active growth inspections amounted to Rs 95,053.50. Fees and charges for the inspection and treatment of plant material have been increased and published in Government Notice 110 of 1980.

11.15.3 *Importation of planting material*

Imported plant material, detailed below, was examined at the harbour and airport for freedom from diseases and pests. Some 1350 tons of seed potatoes (mainly var. Up-to-date) were imported from South Africa, Australia, Holland and France. 16,252 kg of maize seedswere also imported from South Africa, Zimbabwe and France. 32,296 kg of vegetable seeds were imported by commercial firms or individual farmers. Seeds were mainly imported from South Africa, Netherlands, U.S.A., Japan, U.K., France and Australia. Important consignments were as follows: Bean (18,652 kg); Peas (7,912 kg); Carrot (710 kg) and Onion (569 kg).

29.90 kg of various vegetable seeds have been received by the Ministry of Agriculture under the FAO strengthening in vegetable seed production project. Seed samples wer subject to seed health testing and further observations were made in the field for freedom from important diseases.

11.15.4 *Plant Quarantine*

The following were released from quarantine during the year:—

Vine cuttings vars. Musca, Pirobella, Jacques and Erlihane from South Africa. Tobacco seeds vars. TMVRR-2 and Line 2640 from India, Virginia 115 and Speight G41 from Canada, vars. NC 79, NC 89, NC 13 and NC 2326 from U.S.A.

Tomato seeds vars, Kapok No. 2, Kapok No. 3, Apple Green No .1, Apple Green No. 2 and Zhujang Hong from China.

Garlic vars. Nanhai and Kumshan from China.

Strawberry vars. Selecta, Parfaite, Tioga and Tiobelle from South Africa. Citrus budwood vars. Cadenera, Lisbonne, Fairchild, Shambar, Blush imported from Reunion was grafted on two rootstocks Citrange Carrizo and *Citrus volkameriana* but the grafts were unsuccessful.

Grape vine varieties Isabella and Seneca imported from South Africa were indexed for the presence of fan leaf virus and found to be free from the disease.

11.16 *Overseas Missions*

11.16.1 The Divisional Scientific Officer was called upon to visit Rodrigues to assess the phytosanitary situation in the island with special relevance to cultivated crops. He was accompanied by the Senior Scientific Officer (Dr. J. C. Autrey) of the M.S.I.R.I. during the visit which lasted from the 22nd to 26th September 1980.

11.16.2 The Divisional Scientific Officer attended the FAO/Danida Seminar in Quarantine for seed for developing countries of Africa and Asia which was held in New Delhi from November 19th to 2nd December 1980. The Seminar, sponsored by Danida and FAO, dealt specially with phytosanitary regulations and precautions to be taken in the international exchange of seed material.

XII. Animal Production Division

HEAD OF DIVISION: B. HULMAN, DIVISIONAL SCIENTIFIC OFFICER (ANIMAL HUSBANDRY)

12.1 Research in animal production, especially the nutrition aspect, remained among the main activities of the Animal Production Division. As usual, emphasis was made on the utilization of agro-industrial by-products in animal feeding, especially in ruminant feeding, under the guidance of Dr. T. R. Preston, Consultant in Tropical Animal Production to the Project "Milk Production and Procesing" jointly launched by the Government and UNDP (United Nations Development Programme). As from August, the four Livestock Breeding Stations (Curepipe, Reduit, Richelieu and Palmar) became part of the Division, which thus became responsible for their proper running. However, the Senior Technical Officers remained in charge of the stations, while the Scientific Officers, (Animal Husbandry), who formerly had an advisory role, besides conducting research, became directly responsible for the technical management on the stations.

The Divisional Scientific Officer continued to be responsible for the formulation of feeds at the Livestock Feed Factory which manufactures compounded feeds for pigs, poultry, rabbits, cattle and horse. Firms such as Rousselot (France) and Nutrikem (United Kingdom) were requested to help in computer formulation of feeds so that the best least cost formulation could be arrived. Efforts were made to purchase synthetic amino acids, especially methionine, for inclusion in poultry and pig feeds.

12.2 Scientific Officer, Mr. A. A. Boodoo, came back in April after successfully completing a 12-month training course in rumen physiological studies at the Nationl Institute for research in Dairying at Reading, U..K Scientific Officer, Mr. K. L. Yee Tong Wah, left in August for Holland to follow the 10th International Course in Pig Husbandry, initially planned for 6 months. Scientific Officer, Mr. B. Rajkomar, attended the VIth European Poultry Conference of the World's Poultry Science Association which was held in Hamburg, Germany from the 8th to the 12th September.

12.3 A seminar on Agricultural Diversification was held jointly by the Ministry and the University of Mauritius in August. The Divisional Scientific Officer presented a paper outlining the results of research so far obtained and the proposed programme of research. He helped in the drafting of the Plan of Action (for the section on livestock) which was presented in early September as a follow-up to the seminar. He also took part in a forum organised by the Young Farmers' Clubs at Pointe Jerome in December.

12.4 Very severe adverse weather conditions early during the year was the cause of poor performance, especially in terms of milk production at all the stations. At one moment, milk production dropped down to about 1.5 litres/head/day. During the unfavourable climatic conditions, the animals could not be properly fed and, later on, there was a shortage of forage, concentrate feeds and molasses..

In view of the diffculties encountered for obtaining fodder from contractors, especially at Richelieu and Palmar, efforts were made to develop fodder plantations at Richelieu, Palmar and Curepipe. It was decided to develop the 200 arpents at La Brasserie, Curepipe and work in this connection started in December. During the year, Palmar had 10 arpents under acacia and 15 arpents under elephant grass. More lands were being cleared for forage production. At Richelieu, 8 arpents of acacia were planted and, in the interlines of acacia, maize was planted for forage production. At the same time, about 2 arpents of elephant grass and 2 arpents of maize were planted pure stand.It is expected that forage production will be one of the prerequisites of the stations during the next year.

The Friesian cross-bred bulls are continually undergoing performance testing for growth rates at Richelieu Livestock Breeding Station. So far, indications are that the Sahiwal X Friesian bulls are as good as the Simmental X Friesian bulls. A few of the cross-bred heifers calved during the year and their production is being monitored.

12.5 The Ruminant Research Laboratory was in full operation during the year. Interesting results, concerning the volatile fatty acids of animals fed sugar cane and molasses/urea, were obtained and this enabled us to understand better the utilization of the various feeds by the animals. It is hoped that the laboratory, which is an invaluable tool for research, will help to solve many nutritional problems, which have cropped up during experimentation.

12.6 *Scientific Officer*—Mr. G. Naidoo

126.1 *Performance Testing of cattle*

During the year, 36 heifers and 20 young bulls of the following breeds (Friesian, Creole, Sahiwal, Sahiwal X Friesian, Creole XFriesian, Simmental X Friesian) were put on test.

Results (Tables 12.1 and 12.2) indicate that on a ration consisting of 2 kg concentrate (16-18% CP), 1 kg of molasses containing 2.5% urea, and 25 kg poor quality fodder, the Sahiwal X Friesian cross (both males and females) performed better than the other breeds.

The various female crosses will be evaluated for milk production as they calve.

12.6.2. *Effect of varying levels of molasses on milk fat*

At Richelieu Livestock Breeding Station, 118 cows were used to compare 4 dietary treatments. The treatments were 0, 1, 2 or 3 kg/hd molasses, containing 2.5% urea and the cows were given a basal diet of 4 kg cow feed (containing 16-18% CP) and 25 kg fodder. The animals also had access to a mineral mixture and fresh water.

TABLE 12.1

AVERAGE DAILY LIVEWEIGHT GAIN OF YOUNG BULLS ON PERFORMANCE TEST

Breed	*No. of animals*	*Average daily gain (g/day)*
Sahiwal X Friesian ...	2	488
Friesian ...	2	474
Simmental X Friesian ...	2	461
Creole ...	4	402
Sahiwal ...	1	353
Creole X Friesian ...	5	308

TABLE 12.2

AVERAGE DAILY LIVEWEIGHT GAIN OF HEIFERS

Breed	*No. of animals*	*Average daily gain (g/day)*
Sahiwal X Friesian ...	4	426
Friesian ...	5	385
Simmental X Friesian ...	9	382
Creole X Friesian ...	5	323
Creole ...	8	287
Sahiwal ...	3	266

Preliminary Results

There are indications that an increase in molasses intake results in a decrease in milk prorduction and a rise in milk fat % (Table 12.3).

TABLE 12.3

MEAN VALUES FOR MILK PRODUCTION AND MILK FAT % FOR COWS RECEIVING VARIOUS LEVELS OF MOLASSES/UREA (4 MONTHS)

	Molasses kg/head/day			
	0	1	2	3
Milk fat % ...	2.65	3.58	3.85	4.51
Milk production (litres) ...	3.37	3.20	2.87	2.99

12.6.3 *Monitoring the performance of lactating cows*

12.6.3.1 The installation of milk flow meters in the milking parlour enabled the recording of milk production of each cow.

12.6.3.2 All lactating cows were weighed regularly as a check on body condition and on the suitability of the feeding regime.

12.6.4. Natural service, which started in early 1979, has confirmed the net advantage of running bulls with the cows (Table 12.4) over artificial insemination under feedlot conditions.

TABLE 12.4

CALVING INTERVALS OF 82 COWS AT RICHELIEU LIVESTOCK BREEDING STATION

	Calving interval (months)													
	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1979 ...	16	10	14	15	8	8	4	5	7	0	2	2	0	1
1980 ...	44	16	15	4	1	1	1							

12.7 Scientific Officer — Mr. L. K. Ma Poon

12.7.1 *The effect of addition of raw sugar sugar to molasses on growth performance of weaned calves*

12 Friesian X Creole weaned calves of about 100 kg liveweight were used to compare 4 dietary treatments in a completely randomised block design with 3 replicates. The treatments were 0, 10, 20, 40% of sugar in molasses/urea given *ad libitum* to a basal diet of freshly chopped sugar cane tops at the level of 2% of bodyweight (fresh basis), 500 g/head/day of cotton seed cake. The animals also had access to a mineral mixture and fresh water. The animals were individually tied and fed.

Results

Voluntary molasses intake

Consumption of molasses/urea was highest (Table 12.5) in treatment 1—molasses without addition of sugar—and was significantly different ($P < 0.08$) from the 3 other treatments. There was also a significant increase ($P < .01$) in total dry matter intake when sugar was added to molasses.

However, there was no significant difference between treatments as far as feed conversion was concerned. The average daily liveweight gain of animal was not significantly different between the treatment.

There seemed to be no benefit from higher concentrations of sugar than the 10% level.

TABLE 12.5

MEAN VALUES FOR CHANGES IN LIVEWEIGHT, MOLASSES INTAKE, TOTAL DRY MATTER INTAKE AND FEED CONVERSION OF WEANED CALVES RECEIVING MOLASSES/UREA (WITH AND WITHOUT ADDITION OF SUGAR). (3 INDIVIDUALLY FED CALVES PER TREATMENT)

	Added sugar % of total DM					
	0	*10*	*20*	*40*	*SEX*	*(P)*
No. of animals	3	3	3	3		
Daily gain[1] (g)	510	539	526	540		
Molasses/urea intake (kg) DM (Basis)	3.30^{c}	2.7^{b}	2.71^{b}	2.33^{a}	± 0.28	(.08)
Daily total DM intake (kg) (2) ...	4.12^{b}	3.79^{a}	4.16^{b}	4.88	± 0.11	(0.01)
DM conversion	8.47	7.68	7.93	9.30	± 1.16	(N.S)

Note:

1. Determined by linear regression of liveweight on time.
2. Intake of DM/gain in liveweight (kg/kg)
3. a, b, c Figures without common subscript differ at P as indicated.
4. N.S Not significant.

12.8 Scientific Officer Mr. A. Boodoo and Scientific Officer Mr. L. K. Ma Poon

12.8.1 *The effect of addition or raw sugar to molasses on rumen fermentation pattern and protozoa population*

6 young Creole X Friesian bulls of 100 kg liveweight, were used to compare 2 dietary treatments at the Richelieu livestock Breeding Station. The treatments were 0, 10% sugar in molasses/urea given at 2% bodyweight (fresh wt. basis). The animals also received fresh leucaena forage at 4% bodyweight, 500 g/head/day of cotton seed cake, mineral mixture on a free choice basis and fresh water.

Results

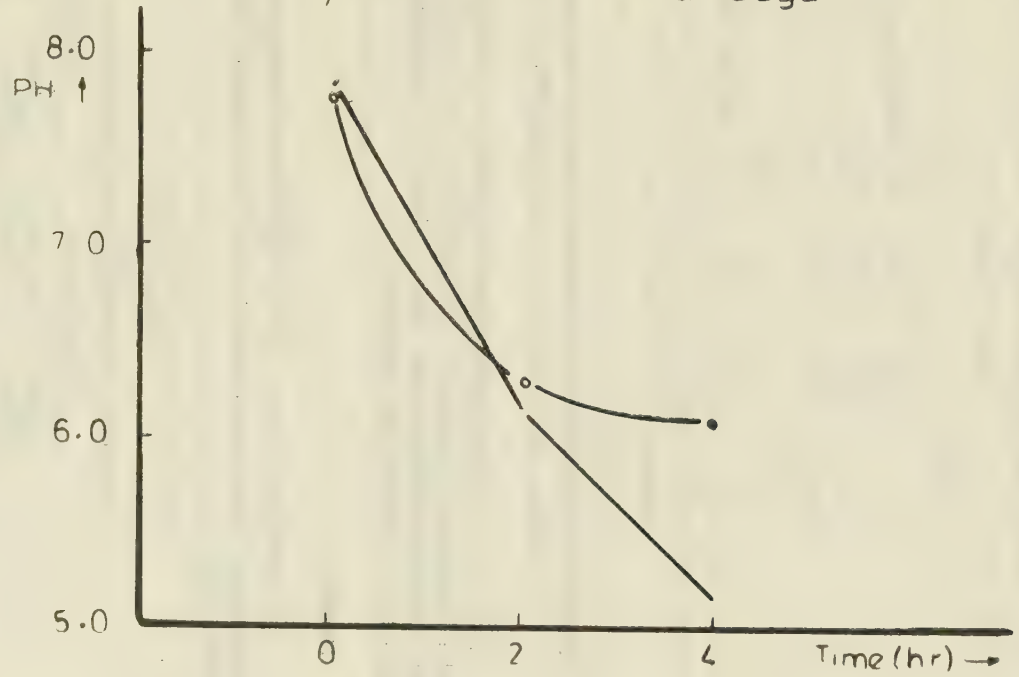
Preliminary results indicate no major difference in the composition of the rumen contents of the animals in the 2 treatments. The inclusion of raw sugar in the basal diet did not cause any important changes in the major rumen VFA proportions (Acetic, propionic and butyric). There was a decline in the proportion of acetate, after feeding and a rise in butyrate after feeding in treatment II, while propionate remained constant. In treatment I, there was a drop in the proportion of propionate and a rise in butyrate, while acetate remained constant (Table 12.6).

TABLE 12.6

MEAN VALUES OF MOLAR PROPORTIONS OF THE MAJOR VFA IN THE RUMEN

VFA	*Time (hr)*	*Without additional sugar*	*With additional sugar*
Acetic ...	0	56.32 ± 6. 2	62.37 ± 1.21
	2	56.65 ± 0.42	58.74 ± 3.03
	4	56.28 ± 2.64	55. 1 ± 3.19
Propionic ...	0	25.81 ± 2.98	23.23 ± 0.61
	2	24.89 ± 0.57	23.54
	4	23.09 ± 2.59	23.88
Butyric ...	0	17.87 ± 3.71	14.39
	2	18.40 ± 0.89	17.71
	4	20.65 ± 1.52	21.02

Fig 121 Rumen pH in young bulls following the ingestion of a basal diet of molasses / urea, leucaena, cotton seed cake (•) (○) with / without additional sugar



Rumen pH was surprisingly slightly lower in the group of animals receiving no additional sugar (Figure 12.1). However, on both groups, rumen pH falls gradually and reaches about 6 four hours after feeding (Table 12.7). At this low pH, it is feared that fibre digestibility may be severely affected.

TABLE 12.7

RUMEN pH IN YOUNG BULLS FED MOLASSES/UREA, LEUCAENA, COTTON SEED CAKE WITH OR WITHOUT ADDITIONAL SUGAR

	Time after feeding (hr)			
Animal	*0*	*2*	*4*	
1	7. 9	6.35	5.85	with sugar
2	7. 8	5.85	5.85	
3	7.75	6.25	6.02	
Mean	7.82	6.18	5.19	
4	8. 0	6.75	5.95	without sugar
5	7. 5	5.90	6. 0	
6	7. 8	6. 1	6.05	
Mean	7.77	6.25	6. 0	

12.8.2 *Comparing effects of leucaena, cane tops on rumen fermentation pattern, and protozoa type and population*

2 groups of 3 Creole X Friesian young calves of 75 kg liveweight were used to compare 2 treatments. The treatments were leucaena at about 4% body weight and chipped cane tops at about 4% bodyweight. The animals received also calf feed and minerals.

Results

On both diets, rumen pH was high before feeding and fell gradually after feeding. There was a tendency for pH to rise again 2 hours after feeding (Table 12.8).

TABLE 12.8

MEAN PH VALUES (MEANS OF 9 READINGS)

	Before changeover		*After changeover*	
	Acacia calf feed	*Sugar cane calf feed*	*Acacia calf feed*	*Sugar cane calf feed*
0 Hr ...	7.76 ± .19	7.44 ± .22	7.58 ± .21	7.58 ± .21
2 Hr ...	6.90 ± .20	6.64 ± .41	6.76 ± .24	6.13 ± .35
4 Hr ...	6.83 ± .33	6.72 ± .4	6.79 ± .21	6.42 ± .44

Contradictory results were obtained, concerning the protozoal counts. Highest value of count occurred before feeding instead of within about 2 hours after feeding (Table 11.9).

TABLE 12.9

MEAN PROTOZOA COUNTS (MEANS OF 18 — 22 READINGS)

	Acacia, calf feed			*Sugar cane, calf feed*		
	Holotrichs	*Entodinio-morphs*	*Total*	*Holotrichs*	*Entodinio-morphs*	*Total*
	$\times 10^6$	$\times 10^6$	$\times 10^6$	$\times 10^6$	$\times 10^6$	$\times 10^6$
0 Hr ...	.21	2.62	2.82	.1	2.54	2.64
2 Hrs ...	.17	1.17	1.34	.092	1.50	1.59
4 Hrs ...	.18	.92	1.07	1.24	1.24	1.32
			After changeover			
0 Hr ...	.24	1.96	2.21	.033	.71	.73
2 Hrs ...	.167	.71	.87	.050	.67	.72
4 Hrs ...	.167	.76	.93	.025	.41	.45

Discussion

Points to note: (1) pH:—a high rumen pH before feeding and a decreasing pH as fermentation takes place. It is to be borne in mind that stomach tube sampling is susceptible to salivary contamination.

(2) *Protozoa*: The highest protozoal count occurs before feeding (for Entodiniomorphs and total counts) instead of within about 2 hours after feeding as expected.

Statistical advice will be sought before analysis is done.

Again, contradictory rumen VFA values were obtained (Table 12.10). Levels of acetate on both diets were low. Further investigations are required to confirm or otherwise values obtained.

TABLE 12.10

MEAN VALUES FOR RUMEN VFA (% MOLAR) AT VARIOUS INTERVALS AFTER FEEDING IN YOUNG CALVES GIVEN A CEREAL BASED CONCENTRATE AND/OR LEUCAENA AND CHIPPED SUGAR CANE TOPS

		Cane		
		0	2	4
Acetic	...	29.72 ± 3.43	30.47 ± 0.9	34.78 ± 9.0
Propionic	...	35.12 ± 0.4	32.77 ± 2.05	33.77 ± 4.8
Butyric	...	35.16 ± 3.4	36.73 ± 2.3	31.4 ± 4.2
		Leucaena		
Acetic	...	27.57 ± 3.02	31.83 ± 1.31	40.77 ± 4.27
Propionic	...	35.24 ± 2.11	33.1 ± 1.65	31.53 ± 2.2
Butyric	...	37.81 ± 1.03	35.07 ± 0.51	27.7 ± 2.86

12.8.3 *Selecting material for filtering rumen fluid*

Three filter materials were tested, viz:

1. Cotton wool
2. Absorbent gauze (45 pores/cm^2)
3. Absorbent gauze (94 pores/cm^2)

Observations

1. *Cotton wool*

It filtered off most of the holotrichs (bigger protozoa) so that, in some filtrates, very few holotrichs were counted, whereas, in others, no holotrichs at all were seen.

2. *Absorbent gauze (45 pores/cm^2)—Rs 45.—a pound*

Even two layers of this gauze let pass an abundant amount of plant materials and particles into the filtrate so that identification and counting were rendered very problematic and therefore inaccurate.

Use of 4 layers also did not give satisfactory results.

3. *Absorbent gauze (94 pores/cm^2)—Rs 30.—a pound*

This gauze gave satisfactory results. A single layer of this gauze proved satisfactory and it could be used for several filtrations. Counting was satisfactory.

Conclusion

This gauze (94 pores/cm^2) was selected as the best for the purpose. In addition, it is cheaper.

12.8.4 *Packed cell volume (PCV) technique for protozoal biomass*

This rapid technique for assessing protozoal biomass, mainly the large holotrich protozoa (dasytrichs and isotrichs), was developed by Leng *et al* (1976) in Mexico and San Domingo (TAP 1979) (Vol. 1 No. 1 p.42). The technique was tried on rumen samples from 6 calves at Richelieu—these averaged 77 kg liveweight and were on a diet of chopped cane top *ad lib.* and calf feed.

Results

The following percentages (PCV) were obtained

Tag No.	*PCV %*
G 587	.80
G 585	.65
G 573	.60
G 593	.65
Br 401	1.15
R 633	1.00
Mean	0.81 ± .22

Discussion

These values appear to be slightly on the low side. Microscopic examination and counting actually showed that the samples contained very few holotrichs despite a sugar cane diet. Further investigations are necessary to gain more information on this matter.

12.9 *Scientific Officer* — Mr. H. Gaya

12.9.1 *Leucaena as a source of protein and roughage for milking cows given molasses/urea*

At Palmar Livestock Breeding Station, 5 Friesian cows were put on Leucaena (2.5% of bodyweight, fresh basis), molasses containing 2.5% urea (2.5% of bodyweight, fresh basis) and 200 g of cotton seed meal. They also had free access to minerals and fresh water. The calves suckled their dams twice daily, during the first month and then, suckled once daily until weaning and as from the 15th day postpartum they were fed Leucaena at 5% bodyweight. The cows were milked once daily in the morning.

Results

The average daily gain of the calves were good in relation to the amount of milk suckled (Table 12.11). This could be attributed to the Leucaena fed.

The performance of the cows was poor both in terms of milk yield and body condition, (Table 12.12) thus raising doubt about the availability of energy from molasses. Milk fat% was also low. The low milk fat and low milk production indicated a possible deficiency of glucose persursors in the diet.

TABLE 12.11

PERFORMANCE OF CALVES

Birth wt. (kg)	25.4 ±0.81
Final wt. (kg)	79.2 ±4.1
Average daily gain (kg) ...	0.423±0.003
Milk suckled kg/d	2.37 ±0.15

TABLE 12.12

PERFORMANCE OF COWS

Milk drawn kg/d	1.71 ±0.4
Total milk produced (drawn + scuckled) kg/d	4.08 ±0.4
Average daily loss in wt. (kg) ...	−0.173±0.006

12.9.2 *Observation of the dry matter intake of Creole cows*

Liveweight change, milk production and daily feed intake of 4 Creole cows, were monitored over a 10 day period at the Curepipe Livestock Breding Station.

Result

The dry matter intake of Creole cow corroborates with the expected dry matter intake (Table 12.13).

TABLE 12.13

DRY MATTER INTAKE OF CREOLE COWS AT CUREPIPE LIVESTOCK BREEDING STATION

Tag No.	*Expected D.M.I. (kg)**	*Actual D.M.I. (kg)*
2006	9.87 ± 0.05	10.6 ± 0.69
2212 (group 2074 fed)	18.47 ± 0.14	21.09 ± 1.22
2232	8.58 ± 0.01	7.69 ± 0.70

*Expected D.M.I. = 0.025 W + 0.1 Y — Courtesy Bulletin 33,M.A.F.F. (U.K.)

D.M.I. = Dry mater intake (kg/day)
W = Liveweight (kg)
Y = Milk yield (kg/day)

12.9.3 *To study the evect of milking 6 or 7 days week on milk yield and calf growth rate*

14 Creole cows were used to compare 2 management systems (1) milking once daily followed by restricted suckling 7 days a week, (2) milking once daily 6 days a week and suckling 7 days a week.

The cows received 40 kg freshly cut fodder/head/day and a standard dairy concentrate at 500g/kg milk. The calves were given fodder and calf concentrate as from the 10th day.

Preliminary Results

Preliminarily results indicate that omitting milking on Sundays did not affect total milk production significantly. (Table 12.14). However, saleable milk in treatment (1) is significantly, higher than in treatment (2). Similarly there is no significant difference in the calves' performance.

TABLE 12.14

MEAN VALUES FOR SALEABLE MILK, TOTAL MILK PRODUCED AND CALF GROWTH RATE OF COWS MILKED 6 OR 7 TIMES A WEEK

	Treatment (1)	*Treatment* (2)	*S.E. of difference*
Saleable milk kg/d ...	8.24 ± 1.0	5.56 ± 0.67	± 1.21*
Milk suckled kg/d ...	2.66 ± 0.27	2.81 ± 0.15	± 0.31$^{N.S}$
Total milk production kg/d	10.90 ± 1.19	8.37 ± 0.72	± 1.39$^{N.S}$
Calf growth rate kg/d ...	0.315 ± 0.037	0.364 ± 0.026	± 0.045$^{N.S}$

12.9.4 *Leucaena leucocephala as a combined source of protein and roughage for cattle fattened on molasses/urea: a comparison of 2 different levels of cotton seed cake*

The trial was carried out at the Savannah Sugar Estate feedlot. The first group (Group I), consisting of 7 yong bulls, were on trial for 40 weeks (18.10.79—23.7.80). During the initial 14 weeks (25.10.79—30.1.80) of the trial, the animals received 200 gms cotton seed cake/head/day as supplement (Period I). Due to the unavaillability of cotton seed cake during the following eleven weeks (31.1.80—15.4.80) of the trial, the animals received 200 gms of feedlot mixture /head/day as supplement instead of cotton seed cake (Period II). During the last 14 weeks (16.4.80—23.7.80) of the trial, the animals received 500 gms cotton seed cake/head/day as supplement (Period III). The second experimental group (Group II) consisted of 14 young bulls, which received 500 gms of cotton seed cake/head/day as supplement throughout the trial which lasted for 23 weeks (9.4.80—17.9.80).

All the animals received as basal diet of molasses/urea containing 2.5% urea fed at the level of 2.5% bodyweight and leucaena given at 3% bodyweight. Minerals and water were freely available.

Results

The performance of the animals (Table 12.15) were moderate (414 to 567 g/day). increasing the level of protein supplements from 200 gms to 500 gms/head/day did not result in any significant improvement, indicating that protein deficiency was not the cause of the animals under-average performance. There was a highly significant difference ($P<.001$) in the consumption index of GIP I and GIP II, receiving 200 gms of protein supplement, as compared to GIP III and GIP II, receiving 500 gms cotton seed cake, confirming luxurious consumption of the two treatments. Therefore, it appears that, when Leucaena is given at 3% liveweight as a suorce of protein and roughage for fattening on a molasses/urea diet, the need for protein supplementation is low. Since this was an observational trial, it is very difficult to conclude on the reason for the poor performance obtained as well as the lack of response to the protein supplements.

12.10 Scientific Officer—Mr. J. P. Teeluck

12.10.1 *Effect of milking frequency in combination with restricted suckling on milk yield and calf performance*

At Curepipe Livstock Breeding Station, 32 Creole and Creole X Friesian cows and their calves were used to ccmpare once or twice milking daily with or without calf suckling in a 2×2 factorial design with 8 replications. The calves suckled their dams twice daily for the first 30 days and once daily afterwards until weaning at 90 days. Non-suckling calves were bucket-fed. All calves received a daily mixture of 100 g fish meal and 10 g mineral mixture as from the 10th day postpartum and had free access to a molasses/urea mixture, containing 2.5% uera (wt/wt) as from the 15th day. The diet of the cows was 40 kg fodder/head/day, supplemented with 5 kg cow feed for the first 7 days after parturition. Afterwards, cow feed was given at 0.375 kg per kg milk produced.

TABLE 12.15

MEAN VALUES FOR LIVEWEIGHT, FEED INTAKE AND CONVERSION

	Group I			*Group II*	*S.E. of difference*
	Period I	*Period II*	*Period III*		
Liveweight (kg)					
Initial	137.8 ± 3.6	167.8 ± 6.7	197.3 ± 9.3	193.3 ± 7.3	
Final	165.8 ± 5.3	197.3 ± 9.3	250.7 ± 9.1	279.1 ± 12.1	
Regressed daily gain kg/d	0.454	0.414	0.434	0.567	± 0.260 NS
Feed Intake kg/d					
Acacia forage	4.57 ± 0.12	5.55 ± 0.13	6.74 ± 0.13	7.20 ± 0.24	
Molasses	3.81 ± 0.10	4.63 ± 0.11	5.62 ± 0.11	6.0 ± 0.11	
Urea	0.095 ± 0.002	0.116 ± 0.003	0.141 ± 0.003	0.150 ± 0.005	
Protein supplement	0. 2	0. 2	0. 5	0. 5	
Minerals	0.05	0.05	0.05	0.05	
Total Dry Matter	4.50	5.42	6.80	7.23	± 0.34***
Consumption Index[1]	2.96	2.97	3.04	3.06	± 0.012***
Conversion[2]	9.91	13.09	13.09	12.75	± 4.61NS

1 = kg DM/100 kg liveweight
2 = kg DM Intake/kg gain in liveweight

TABLE 12.16

EFFECT OF MILKING FREQUENCY AND SUCKLING FREQUENCY ON ANIMAL PERFORMANCE

	Once milking		*Twice milking*		*S.E*[2]
	Without Suckling	*With Suckling*	*Without Suckling*	*With Suckling*	
No. of calves	8	7	8	8	
Initial LW (kg)	30.5 ± 0 .85	30.4 ± 1 .59	32.0 ± 1.20	30.7 ± 0 .81	
Final LW (kg) (90 days old)	54.8 ± 2. 93	49.4 ± 2 .93	59.9 ± 2.51	51.6 ± 2 .72	
Livewt. gained kg/d	0.289	0.213	0.330	0.234	0.026**
No. of Cows	8	8	8	8	
LW Initial (kg)	331.8 ± 12.20	358 ± 10.68	346.8 ± 7.99	359.9 ± 11.42	
LW at 90 days (kg)	337.9 ± 14.81	358 ± 10.11	343.3 ± 9.33	346 ± 11.21	
LW changed kg/d	0.113	—0.002	—0.042	—0.162	0.058
Daily feed intake (kg) of calves					
Milk	3.3	2.1	3.3	2.2	0.136***
Molasses	0.227	0.152	0.392	0.218	0.128NS
Fish meal	0.107	0.072	0.104	0.075	0.008***
Conversion kg of milk/kg LW gained	12.72	10.39	10.31	10.23	1.018NS
Daily milk production (kg)					
By milking	5.88	6.12	6.85	6.66	0.818NS
Consumed by calf	3.30	2.10	3.30	2.20	0.136***
Saleable	2.58	6.12	3.55	6.66	0.815***
Total	5.88	8.24	6.85	8.86	0.856***

[1] Determined by linear regression of liveweight on time

[2] Standard error of difference between any two means

Results

The overall growth rate of the non-suckling calves was significantly better ($P < 0.001$) than the suckling calves, irrespective of milking frequency (Table 12.16). This was attributed to the higher milk consumption and fish meal intake of the non-suckling group.

Both milking and suckling frequencies had a significant effect on the liveweight change of the cow. There was no interection between milking and suckling.

The performances of the cows which were being suckled by their calves were significantly better than those which did not suckle their calves both in terms of total milk yield ($P < 0.01$) and saleable milk ($P < 0.001$) (Table 12.17). However, there was no difference in milk production between once and twice milking daily for cows which were suckled by their calves.

TABLE 12.17

EFFECT OF MILKING FREQUENCY AND SUCKLING FREQUENCY ON DAILY WEIGHT GAIN, DAILY FEED INTAKE AND DAILY MILK PRODUCTION (MEAN VALUES FOR MAIN TREATMENT EFFECTS)

	Effect of milking			*Effect of suckling*			SE^2
	Once	*Twice*	*P*	*Without*	*With*	*P*	
Daily LW gained (kg)							
Calf	0.251	0.282	0. 25	0.310	0.224	0.001	0.018
Cow	0.056	—0.102	0.001	0.036	—0.082	0. 01	0.041
Daily Feed Intake (kg)							
Milk	2. 7	2. 75	—	3. 3	2. 15	0.001	0.091
Molasses	0.190	0.305	0. 25	0.310	0.185	0. 25	0.089
Fish meal	0.090	0.090	—	0.106	0.074	0.001	0.006
Conversion kg milk/kg LW gained	11. 39	10. 28	0. 25	11. 35	10. 32	0. 10	0.707
Daily milk production (kg)							
By milking	6. 00	6. 76	0. 25	6. 37	6. 39	—	0.578
Total production ...	7. 06	7. 86	0. 25	6. 37	8. 55	0. 01	0. 61
Saleable	4. 35	5. 10	0. 25	3. 06	6. 39	0.001	0. 58

12.10.2. *A note on the use of Cassava (Manihot esculenta) as a combined protein and roughage source for growing cattle fed ... molasses/urea*

At Savannah Sugar Estate, 4 male and 4 female crossbred cattle age 4-6 months were used to compare the following 2 treatments: 0 or 200 g cotton seed cake per animal per day. The animals received a basal diet of molasses/urea mixture containing 2.5% urea, restricted to 2.5% of bodyweight, fresh cassava forage at 4% bodyweight. Minerals and water were provided on a free choice basis.

Results

Animals performance on the treatment without cotton seed meal was poor (290g/d), however, a significant improvement was recorded when the basal diet was supplemented by cotton seed cake at 200 g/head/day (Table 12.18). Growth rate was also more uniform in the cotton seed cake supplemented group (r^2=0.93 v/s 0.85), indicating the superior nutritive value of this diet.

TABLE 12.18

MEAN VALUES FOR ANIMAL PERFORMANCE ON MOLASSES/UREA, SUPPLEMENTED WITH CASSAVA FORAGE, WITH OR WITHOUT COTTON-SEED MEAL (ONE GROUP OF 4 ANIMALS PER TREATMENT)

	Without Cottonseed	*With Cottonseed*	*SE— X*
Liveweight, kg			
Initial ...	104	81	
Final ...	133	127	
Daily gain ...	0.292	0.488	±.079*
Feed intake, kg/d			
Cassava forage ...	4.72	4.17	
Molasses ...	2.96	2.60	
Urea ...	0.089	0.078	
Cotton cake ...	—	0.20	
Minerals ...	0.06	0.06	
Total DM ...	3.36	3.14	
Consumption index[1] ...	2.88	3.02	
Conversion[2] ...	11.5	6.43	

*($P < .05$)

1 (Daily DM intake/100 kg liveweight)

2 kg feed DM/kg liveweight gain

12.10.3 *A note on the performance of low birthweight calves reared under feedlot conditions*

23 young Friesian, Creole X Friesian calves with birthweight, ranging from 12-33 kg, were randomly grouped, irrespective of their weight. The calves suckled their dams twice daily for 1st month and once daily afterwards until weaning. They had access to concentrate and chipped sugar cane tops. During the last 30 days of the observation, the calves were fed molasses/urea mixture containing 2.5% urea (wt/wt) on a free choice basis and Leucaena at 4% bodyweight.

Results

The calves with a low birthweight (< 25 kg) had a lower weaning weight associated with a lower growth rate (P < 0.10) than those whose birthweights were above 25 kg (Table 12.19). Consequently, the low birthweight calves would take a longer time to reach a weight similar to the weaning weight of a normal calf. The low birthweight calves also need more care and attention.

TABLE 12.19

MEAN VALUES OF ANIMAL PERFORMANCE OF LOW BIRTH CALVES (< 25 KG) COMPARED WITH NORMAL CALVES (> 25 KG)

	Birthwt. group	
	< 25 kg	*> 25 kg*
No of animals	12	11
Average birthwt., kg	16.8	28.5
Average weaning wt., kg	57.3	74.8
Weaning age, day	140	135
Average animal performance, kg/d ...	0.289	0.344

S.E. ± 0.039
P < 0.10

12.10.4 *Effect of molasses on milk production and composition*

The effect of molasses on milk production and composition was examined at Palmar Livestock Breeding Station. 27 cows were randomly divided into 2 groups. One group received molasses/urea at 3 kg/hd/d while the second group was not fed molasses/urea. All the animals were given 4 kg of concentrrate and 25 kg fodder.

Results

Preliminary results indicate that the milk fat content of the milk, produced by the cows receiving molasses/urea tends to be higher than the cows not receiving extra molasses/urea (Table 12.20).

TABLE 12.20

MEAN VALUES FOR MILK FAT CONTENT OF MILK PRODUCED BY COWS GIVEN CONCENTRATE WITH AND WITHOUT ADDITIONAL MOLASSES

	Fat % in milk	
	Concentrate	*Concentrate+3 kg Molasses/urea*
September 1980 ...	3.01	4.15
October 1980 ...	3.45	5.52
November 1980 ...	2.63	4.45
December 1980 ...	3.44	4.22

Observation is still in progress.

12.10.5 *Performance of Rodriguan sheep*

The Rodriguan sheep, which were received in October, 1978, seem to thrive very well at Palmar and have fully adapted to local conditions. There seems to be no problem regarding health and reproduction. The flock is being strictly managed to avoid in-breeding.

The performance of the flock up to December 1980 is summarised below:—

Average birthwt.	*3.0 kg (Males). 2.4 kg (Females)*
Average weaning wt. (120 days old) ...	22.2 kg
Mortality rate at birth (including still born)	9.52%
Mortality rate from birth to weaning ...	2.38%
Fertility rate of ewe	94.74%
Lambing rate of ewe	131.25% (Twins)
Conception rate of ewe	110.53%
Lambing Interval	219 days

12.10.6 *Monitoring of creep feed intake*

The creep feed intake of piglets was monitored to have an estimation on the amount of feed, consumed by an average pig litter size.

Results based on 20 litters are summarised below:

Litter size at weaning	10
Birthwt. of piglet	1.05 kg
Weaning wt. of piglet	13.20 kg
Quantity of creep feed consumed by one litter	42.0 kg
No. of creep feeding days	46
Weaning age (days)	53
Feed conversion, kg creep feed/kg LW gained ...	3.46
Average daily intake of pig starter by lactating sow	5.7 kg

Both creep feed and pig starter contain milk powder at the rate of 22% and 15% respectively.

12.11. Scientific Officer—Mr. B. Rajkomar

12.11.1 *Evaluation of broiler feeds*

Day old male Ross I hybrids were used to compare 3 broiler feeds in a randomised complete block design with 2 replicates. In a first trial there were 50 day-old chicks per replicate, while in a second trial, there were 20 day-old chicks per replicate.

The broilers were raised on deep litter, using wood shaving, in a naturally ventilated house. The chicks were fed broiler starter mash for the first five weeks and, for the remaining 3 weeks, they were fed finisher mash. At the end of the trial, 10 birds were randomly selected from each replicate and slaughtered to determine the dressing percentage.

Results

In trial 1, at 5 weeks, there were significant differences in liveweight gains ($P < 0.01$) between the treatments (Table 12.21). However, at 8 weeks, liveweight gains for Feed 1 and Feed 2 were nearly simlar, while Feed 3 gave significantly better liveweight gains than Feed 1 and Feed 2($P < 0.05$). At eight weeks, there was no significant difference in terms of feed converson between the treatments (Table 12.22). In trial 2, at 5 weeks, Feed 1 differed sgnificantly from the other 2 feeds ($P < 0.05$), while Feeds 2 and 3 gave simlar performance. At 8 weeks, however, there was no signficant difference between the treatments. Feed converson with Feeds 2 and 3 were significantly better than Feed 1 at both 5 weeks ($P < 0.01$) and at 8 weeks ($P < 0.05$).

There was no signification difference in dressing % for both trials, although in the 2nd trial, the dressing % was higher (Table 12.23). Feed cost per kg liveweight gain for the 3 treatment in the 2 trials are given in Table 12.24.

TABLE 12.21

AVERAGE LIVEWEIGHT GAIN (g) AT 5 AND 8 WEEKS FOR 2 TRIALS

		Trial 1		*Trial 2*	
		5 weeks	*8 weeks*	*5 weeks*	*8 weeks*
Feed 1	...	761.5^{a}	1593.5^{a}	921.7^{a}	2017.2^{a}
Feed 2	...	899.0^{b}	1560.5^{ab}	1106.5^{b}	2288.85^{a}
Feed 3	...	1003.7^{c}	1938.2^{c}	1102.0^{bc}	2170.5^{a}
SE	...	.0158	.059	.051	.1049
P	...	.01	.05	.05	.05

Within trial figures in the same column with a common superscript letter (a, b. c) are not significantly difference at 5% or 1% level, as indicated.

TABLE 12.22

AVERAGE CUMULATIVE FEED CONVERSION AT 5 AND 8 WEEKS FOR THE TWO TRIALS

		Trial 1		*Trial 2*	
		5 weeks	*8 weeks*	*5 weeks*	*8 weeks*
Feed 1	...	2.125^{a}	2.495^{a}	2.265^{a}	2.52^{a}
Feed 2	...	2.06^{ab}	2.59^{a}	1.89^{b}	2.34^{b}
Feed 3	...	1.895^{c}	2.315^{a}	1.885^{bc}	2.35^{bc}
SE	...	.014	.167	.0187	.0436
P	...	.01	.05	.01	.05

TABLE 12.23

AVERAGE DRESSING PERCENTAGE FOR 2 TRIALS

	Dressing Percentage	
	Trial 1	*Trial 2*
Feed 1 ...	69. 65a	71.85a
Feed 2 ...	68. 45a	72. 2a
Feed 3 ...	67. 8a	72a
SE ...	1.939	.41
P ...	.05	.05

TABLE 12.24

FEED COST PER Kg LIVEWEIGHT GAIN AT 8 WEEKS (Rs)

	Feed 1	*Feed 2*	*Feed 3*
Trial 1 ...	5.37	8.07	5.93
Trial 2 ...	7.32	8.23	7.79

12.11.2. *Evaluation of the Richelieu Livestock Feed Factory Chick Feed*

Two types of chick feeds manufactured by the Richelieu Livestock Feed Factory were compared in an observational trial. Feed I was a high energy feed with a metabolisable energy of 3010 kcal/kg, while the Feed II has an energy content of 2911 kcal/kg (calculated values). The crude protein content of both feeds was 24.8%.

A group of 25 three-day old Ross Brown female hybrid chicks was put on each feed.

Results

Chicks on Feed II performed better than those on Feed I both in terms of liveweight gain and cumulative feed conversion (Table 12.25 and 12.26). The overall appearance of birds on Feed II was better than those on Feed I, feathering was also more advanced for the former group. Feed costs to 7 weeks was lower with Feed II (Rs 4.56) than with Feed I (Rs 5.31).

However, further investigations are necessary before drawing any sound conclusion.

TABLE 12.25

AVERAGE LIVEWEIGHT (g) OF CHICKS

Age (days)	Average liveweight (g) Feed I CF/80/II	Feed II CF/80/III
3 ...	... 42	42
10 ...	... 47.8	50
17 ...	... 73.9	78.3
24 ...	... 115.2	128.3
31 ...	... 167.4	191.3
38 ...	... 221.7	247.8
45 ...	... 302.4	338.6
49 ...	... 357.2	388.6

TABLE 12.26

CUMULATIVE FEED CONSUMPTION (g) AND CUMULATIVE FEED CONVERSION

Period	Cnmulative Feed Consumption (g) Feed I CF/80/II	Feed II CF/80/III	Cumulative Feed Conversion Feed I CF/80/II	Feed II CF/80/III
3rd - 10th day ...	71.7	69.6	12.36	8.7
11th - 17th day ...	173.9	182.6	5.45	5.03
18th - 24th ...	295.6	319.5	4.04	3.70
25th - 31st ...	491.2	484.7	3.92	3.25
32nd - 38th ...	934.7	836.7	5.20	4.06
39th - 45th ...	1425.2	1286.7	5.47	4.34
to 49th ...	1775.2	1498	5.63	4.32

12.11.3 *Observations on the effect of inclusion of coral sand in the ratino of parent stock layers (Rose Ranger)*

The level of calcium in layer diets has a determining role in egg shell quality. The layer ration (Layer Feed 1) manufactured by the Richelieu Livestock Feed Factory has a low calcium level. A ration with a higher level of calcium was formulated by the inclusion of 4% coral sand (Layer Feed 2). A pen Ross Ranger Breeders was put on this feed while the birds in 2 other pens received the ordinary feed.

Results

There was no consistent trend in the hen-day production and fertility % eggs set. However, hatchability % eggs set appeared to be better in the group receiving layer Feed 2 (Table 12.27).

Analysis showed that the calcium content in both feeds were still below recommended levels.

TABLE 12.27

FERTILITY AND HATCHABILITY OF EGGS FROM TREATMENT AND CONTROL GROUPS

Group	*Age (weeks)*	*HDP (%)*	*Fertility % set*	*Hatchability % set*	*Hatchability % Fertile*
Treatment (T) ...	49	64.9	88.9	83.6	94.0
Control (C) ...		62.6	90.2	73.6	81.6
T ...	50	63.7	89.4	86.8	97.0
C ...		67.7	90.8	79.5	87.5
T ...	51	61.8	89.5	87.6	97.9
C ...		66.5	89.3	77.2	86.4
T ...	52	61.8	89.1	83.7	94.0
C ...		67.2	89.8	76.0	84.6
T ...	53	63.5	90.6	83.3	91.9
C ...		64.3	89.6	76.4	85.2
T ...	54	64.3	90.3	79.1	87.6
C ...		62.3	90.0	79.8	88.7
T ...	55	60.9	87.7	76.0	86.6
C ...		55.6	90.0	75.4	83.8
T ...	56	63.1	89.6	75.4	84.1
C ...		61.2	90.4	74.8	82.7
T ...	57	60.2	91.0	77.8	85.5
C ...		62.2	90.8	72.7	80.1
T ...	58	60.4	88.8	74.4	83.8
C ...		61.2	90.1	73.9	81.9
T ...	59	59.9	86.9	74.5	85.7
C ...		60.6	86.9	75.9	87.4
T ...	60	59.3	86.9	71.9	82.6
C ...		59.2	91.0	70.2	77.2

12.11.4 *Evaluation of Ross Tint and Ross Brown...*

Data on the perfomance of the Ross commercial strains, under controlled conditions, are not available. A trial was set to evaluate two strains (Ross Tint and Ross Brown), as regards feed consumption, egg production, egg size, etc.

Preliminary data

The average liveweight and feed consumption for the rearing period to 10 weeks of age are given in Table 12.28. Data on the production performance of the 2 Ross Commercial egg production strains will be collected as soon as laying starts.

TABLE 12.28

AVERAGE LIVEWEIGHT *(g)* AND FEED CONSUMPTION *(g)* FOR ROSS TINT AND ROSS BROWN PULLETS

	Liveweight (g)		*Cnmulative Feed Consumption (g)*	
	Ross Tint	*Ross Brown*	*Ross Tint*	*Ross Brown*
day old ...	42.5	41.25	—	—
14 ...	76.25	76.25	100.0	97.5
28 ...	166.25	161.25	352.5	315.0
42 ...	312.5	328.75	1025.0	873.75
56 ...	473.3	515.3	1765.0	1535.45
70 ...	710	781.6	2498.3	2508.75

12.11.5 *Performance of ducks at Curepipe Experimental Station*

(i) *Egg production*

A group of 40 ducks, produced a total of 689 eggs for the period January to December, 1980—the average being 17 per duck.

The mortality in that group was 10% to the end of December.

(ii) *Incubation and Hatching*

A total of 321 eggs were incubated, at the Poultry Breeding Centre and under broody ducks. Only 89, that is 27.7% hatched. Following the very low hatchability of eggs sent to Poultry Breeding Centre, the practice was discontinued. Improved hatching will help to increase the returns from the duck flock.

(iii) *Fattening*

A number of ducklings were fattened. Some were sold; others selected to replace old stock. 10 ducklings were also sent to Rodrigues.

A group of ducklings was fattened and its performance recorded. The data is presented in a note below.

A note on the fattening of Muscovy ducklings

Introduction

The Muscovy duck flock at Curepipe Experimental Station has undergone intensive inbreeding. This has an adverse effect on the growth performance of ducklings.

Data has been collected on the performance of a group of ducklings, so that subsequent comparisons may be made, following cross breeding of the existing flock with other unrelated groups.

The performance of 16 unsexed ducklings, kept during the 1st month in a battery brooder and then in a deep litter pen, was monitored.

Results

The liveweight, feed conversion and consumption, are set out in Table 12.29. The individual performance of 6 ducklings to 12 weeks of age are given in Table 12.30.

The group-growth performance was affected by two changes in the feeding. Chick feed (23%protein) was twice replaced by poultry feed (20% protein) in part or totally. During the last two weeks, feed conversion deteriorated due to the birds being moved to a new pen. The overall cumulative feed conversion can be improved.

TABLE 12.29

PERFORMANCE OF DUCKLINGS AT CUREPIPE EXPERIMENT STATION

Age (weeks)	*Livewt. (g)*	*Feed Consumption (g)*	*Livewt. gain (g)*	*FC*	*Cumulative Lwt. gain*	*Cumulative Feed consumption*	*Cumulative FC*
day old	800	—	—	—	—	—	—
3	4745	9220	3945	2.33	3945	9220	2.33
5	8275	6400	3530	1.81	7475	15620	2.09
6	11050	7200	2775	2.59	10250	22820	2.23
8	20450	12000	9400	1.28	19650	34820	1.77
10	27950	17600	7500	2.35	27150	52420	1.93
12	31000	23000	3050	7.54	30200	75420	2. 5

TABLE 12.30

INDIVIDUAL PERFORMANCE OF DUCKLINGS

No.	*Age (weeks)*						*Wt. gain over 9 weeks period (g)*
	3	*5*	*6*	*8*	*10*	*12*	
	Liveweight (g)						
1	295	500	650	1200	1500	1800	1505
2	180	300	400	700	1000	1200	1020
3	395	700	900	1800	2450	2750	2355
4	325	600	800	1600	2250	2550	2225
5	315	575	750	1600	2500	2800	2485
6	310	550	675	1200	1500	1800	1490

12.12 *Curepipe Livestock Breeding Station*

12.12.1 *Senior Technical Officer* — Mr. Sheik Hossen

12.12.2 *Milch Cattle*

At the end of the year 1980, the Curepipe Livestock Breeding Station carried a total of 146 heads of milch breed, 8 sires, 12 young bulls, 8 bull-calves, 69 cows, 31 heifers and 18 heifer-calves. There were 68 calvings during the year—28 males and 40 females. The average birth weight was 28.3 kg and average weaning weight at 90 days was 56.5 kg. The number of calves, weaned during the year, were 34 males and 32 females. 1 case of abortion and 1 of still born were recorded.

Sale — 19 young bulls and 25 young heifers were sold to small breeders. 2 adult bulls, 3 heifers, 27 cows were sold for slaughter through the Mauritius Meat Authority.

Death — 5 young bulls, 5 heifer-calves and 1 cow died during the year.

12.12.3 *Milk Production*

The total quantity of milk, produced during the year, was 94,603.2 litres, out of which, 19,227.7 litres were fed to calves, piglets and rabbitlings; 28,742.0 litres were sold to hospitals; 29,136.0 were sold to contractor; 43.0 litres were discarded and 166.5 litres were sent for lab-analysis.

Milk production data are given in Table 12.31. The average daily production was 5.2 kg per head.

TABLE 12.31

MILK PRODUCTION OF COWS AT THE CUREPIPE LIVESTOCK BREEDING STATION

Animals	*Daily milk production (kg)*		
	Group Average	*Best Cow*	
		Average	*Peak*
1st calves ...	4.5	6.2	12.5
2nd calves ...	4.2	5.0	11.0
3rd calves ...	5.5	6.6	9.5
Others ...	6.5	11.9	22.5

12.12.4 *Experiments*

(a) Experiment—"Performance of growing animals on a molasses/urea diet and restricted grazing"—started in February, 1980, under the supervision of Scientific Officer, Mr. J. P. Teeluck, and ended in December, 1980.

(b) Experiment—"To study the effect of milking 6 or 7 days a week on calf-growth rate"—started in the middle of February, 1980, under the supervision of Scientific Officer, Mr. H. Gaya, and the experiment is still in progress.

12.12.5 *Pigs*

Some pigs were transferred to Palmar Livestock Breeding Station for breeding purposes, while others were sold for slaughter through the Pig Marketing Federation.

12.12.6 *Data concerning piggery*

No. of litters	18
No. of piglets born	169
Average litter size	9.4
Average litter size at weaning ...	6.0
Average weight at birth (kg) ...	1.4
Average weight at weaning (kg) (8 weeks)	13.0

12.12.7 *Sale*

3 boars, 12 sows and 2 gilts were sold for slaughter, 79 pig-weaners were sold to the Mauritius Pig Co-operative Federation Limited for distribution to its members.

12.12.8 *Rabbits*

At the end of the year, the total number of rabbits was 181 and comprised 33 bucks, 21 young bucks, 30 does, 19 young does and 78 rabbitilings. There were 63 kiddings during the year, yielding a total of 306 rabbittlings.

Sale—108 rabbits were sold to small breeders and 16 rabbits were sold for slaughter.

Death—7 males, 10 females and 123 rabbittlings.

12.12.9 *Manure*

The quantity of manure delivered from the station was 1,544.475 tons. Out of this 1188.5 tons were collected by the Experiment Stations of the Ministry and 150.0 tons were sold to the Development Works Co-operation, 104.0 tons were sold to other Ministries and 111.975 tons sold to small farmers.

12.13. *Richelieu Livestock Breeding Station*

12.13.1 *Senior Technical Officer—Mr. D. Ramessur*

12.13.2 *Milch Cattle*

At the end of the year 1980, theRichelieu Livestock Breeding Station carried a total of 440 heads of milch cattle—254 cows, 80 heifers, 32 heifer calves, 34 bulls, 35 bull calves and 35 sires. There were 229 calvings during the year—111 females and 122 males. Four cows gave birth to twins. Seven cases of abortion were recorded. The average birth weight was 25 kg and average weaning weight at 90 days was 57 kg. The number of calves weaned during the year was 255.

Death:—12 cows, 5 heifers, 42 calves, 2 young bulls—6 still born were also recorded. High rate of mortality in calves was due mainly to pneumonia because of bad weather conditions, which prevailed at the beginning of the year.

Sale of animals: 29 male calves and 6 heifers were sold to the Mauritius Meat Producers' Association for breeding purposes. 34 cows, 67 heifers, 37 young bulls and 156 bull calves were sold to individual breeders. 88 animals were culled and sold to the Mauritius Meat Authority and 37 heifers were sent to the Palmar Livestock Breeding Station for sale to small breeders.

12.13.3 *Sahiwal Cattle*

At the end of the year, there were 1 bull and 3 pregnant heiffers.

12.13.4 *Milk Production*

During the year, 158,430.4 litres of milk were produced of this 2865.8 litres were fed to calves, 54,799 litres were sold to Brown Sequard Hospital, 36,465 litres were sold to Victoria Hospital, 28,155 litres were sold to contractors, 35.361.9 litres were sold to the staff and public and 269.6 litres of milk were sent to the Diary Chemistry Division for analysis. The loss of milk occurred through decantation and handling for the year amounted to 387.1 litres and 100 litres were discarded due to mastitis. Cows are machine- milked once daily in th morning. Calves suckled their dams twice during the 1st month after calving and once afterwards until weaning.

12.13.5 *Sale of Manure*

The manure produced was disposed of as follows: 49.15 tons were sold to the public and 284 issued to the other Divisions of the Ministry.

12.13.6 *Development*

The construction of the office-cum-store building is now nearing completion.

12.13.7 *Fodder*

The 20 arpents of sugar cane plantations were harvested ,chopped and fed to animals. To increase fodder production on the station 3.6 arpents of elephant grass and 19.1 arpents of acacia were planted with maize ,planted in the interlines. 7 arpents of maize were also planted for fodder. This maize plantation was of considerable help in the feeding of animals, during the last week of December, 1980.

12.14 *Palmar Livestock Breeding Station*

12.14.1 *Senior Technical Officer* — Mr. R. Fakim

12.14.2 *Milch Cattle*

At the end of the year 1980, the Palmar Livestock Breeding Station carried a total of 251 head of cattle — 13 sires, 9 bulls, 23 bull calves, 105 cows, 46 adult heifers, 22 young heifers and 26 heifer calves.

Birth: During the year, a total of 173 calves (97 males and 76 females) were born from 126 cows and 45 heifers. 3 cows calved twins. The average birth weight was 24.5 kg for males and 24.0 kg for females. Calves, born from cows, averaged 27.0 kg at birth and those from heifers 19.0 kg. 7 still-births and 6 cases of abortion were also recorded.

Weaning-Weight: Calves are weaned at the age of 4 months. The average weaning weight was: 67.6 kg for bull calves and 67.8 kg for heifer calves.

Death: A total of 72 animals died during the year viz, 14 cows, (including 2 collected from cowkeepers in the Rural Development Project); 6 adult heifers, (including 1 collected from cowkeepers); 19 female calves, (including 7 collected from cowkeepers and 33 male calves, (including 8 collected from cowkeepers).

The high mortality rate was due to the bad weather conditions, which prevailed during the first two months of the year.

Sale: 19 young bulls and 59 heifers were sold to the Mauritius Meat Producers Association. 159 young bulls and 97 heifer calves were sold to small breeders. 91 cows and 27 heifers, 2 female calves, 7 adult bulls and 1 young bull were sold for slaughter through the Mauritius Meat Authority.

Collected: 10 cows, 10 male calves and 8 female calves were collected from cowkeepers of the Rural Development Project.

12.14.3 *Milk Production*

60,179 litres of milk were produced during the year; the average milk yield per cow per day was 3.02 litres. 21,840 litres were issued to the Central Flacq Hospital. 5,791 litres were fed to calves, 1,135 litres to piglets and 356 litres to kids. 80 litres were issued to the Diary Laboratory for routine analysis. 30,977 litres were sold to the public.

Cows are machine-milked once daily. Calves arre left to suckle their dams twice daily for the first 30 adys post calving and once daily till weaning.

12.14.4 *Feeding*

Until May 1980, the feeding regime was as follows:

1 month before calving	4 kg/head/day
First 100 days after calving	4 kg/head/day
101st day until end of lactation ...	2 kg/head/day
Dry cows	1 kg/head/day

All cows had free access to a molasses/urea mixture, containing 2.5% urea and received also chipped cane at 3% of bodyweight (fresh weight basis).

Due to the unavailability of molasses, the feeding regime was modified as from the end of May. Cows were fed 30 kg of chipped cane and concentrate at the following level:

(i) 5 kg cow feed per day for pregnant cows for 30 days precalving, and for milking cows 100 days post calving and

(ii) 4 kg of cow feed per day, for the remaining period of lactation;

(iii) 2 kg cow feed per day for dry cows.

Only one group of 15 milking cows were maintained on a molasses urea diet at 1% bodyweight.

Calves were fed on molasses ad lib. and on either acacia when available at the rate of 3-4% body weight, or about 500 grammes of calf feed per head per day.

Bulls: Bulls are fed molasses-urea mixture ad lib.: 1 kg bull feed and 30 kg fresh fodder.

12.14.5 *Miscellaneous*

Pregnancy diagnosis: A total of 359 cows and heifers were assessed: 190 cows were found to be pregnant, 132 not pregnant and 37 were doubtful cases.

12.14.6 *Herd cattle*

At the end of the year, there were 53 heads of Ongole, 32 heads of Boran and 285 heads of Zebu cattle. The herd consisted of 6 sires, 4 bulls, 31 young bulls, 58 bull-calves, 103 cows, 90 heifers and 78 heifer-calves.

Birth: There were 112 calvings during the year—45 males and 67 females. 2 still-births were also recorded.

Sale: 29 bulls, 37 cows and 9 heifers were sold for slaughter through the Mauritius Meat Authority.

4 bulls and 7 heifers were sold to the Meat Producers Association for breding purposes.

25 castrated bulls were sold to carters for draught purposes.

Transfer:

14 bulls were transferred to the Agricultural Services of Rodrigues. 1 heifer was transferred to the Animal Health Laboratory, Reduit for surgery and it eventually died.

Death:

21 bulls, 4 cows, 11 bull-calves, 14 heifers and 13 heifer-calves died during the early months of the year mainly because of the adverse climatic conditions.

Pregnancy diagnosis:

82 cows were assessed during the year. 38 were found to be pregnant; 33 were not pregnant and 11 were doubtful cases.

12.14.7 *Miscellaneous*

An observation on feedlot fattening of Zebu animals was started at the beginning of November. Two groups of young weaners: 9 bulls and 9 heifers were transferred to the Dairy feedlot. The animals are fed molasses/urea (2.5%) ad lib. fodder plus a supplement of cowfeed or acacia at 3% body-weight when available. The performance of the animals are being assessed regularly.

12.14.8 *Sahiwwal Cattle*

At the end of December, there were 21 head of Sahiwal cattle—3 adult bulls, 3 young bulls, 2 bull calves, 6 cows, 6 heifers and 1 heifer-calf.

Birth: There were 7 calvings dulring the year: 2 males and 5 females. 1 case of abortion was also recorded.

Sale: 1 cow and 1 young bull were sold for slaughter through the Mauritius Meat Authority.

Death: 4 heifer-calves and 1 bull-calf died during the year.

12.14.9 *Goats*

(a) Anglo-Nubian breed

At the end of the year, there were 211 Anglo Nubian goats on the station—83 males and 128 females. There were 65 kiddings, giving a total of 116 kids (67 males and 49 females). The average weight at birth was 1.95 kgs and the average weaning weight at 120 days was 13.8 kg for the male kids and 12.5 kgs for the female kids. Six cases of abortion were recorded during the year.

Sale: 6 does and 4 young females were sold for slaughter. 12 bucks and 2 does (unfit for breeding) were sold for fattening purposes, 6 bucks and 13 does were sold to breeders.

Death: 11 young bucks, 3 does and 27 kids died during the year.

Transfer: 31 young bucks and 26 young does were transferred to the Extension Services for sale to small breeders.

12.14.10 *(b) Jumna Pari breed*

There were 96 Jumna Pari goats on the station at the end of the year, consisting of 31 males and 65 females. There were 31 kiddings, giving a total of 45 kids (22 males and 23 females) with an average weight of 2.0 kg per kid. The average weaning weight at 120 days was 15.0 kg for the male kid and 12.8 kg for the female kid.

Sale: 1 buck and 3 does were sold for slaughter; 9 bucks and one doe (unfit for breeding) were sold for fattening; 6 does were sold for breeding purposes.

Death: 4 young males, 5 male kids, 3 does, one young female and one female kid died during the year.

Transfer: 24 young bucks and 15 young does were transferred to the Extension Services for sale to small breeders.

12.14.11 *Pigs*

At the end of the year, there were 271 pigs on the station of the following breeds: large white, wessex saddle back and their crosses,, consisting of 6 boars, 3 young boars, 36 sows, 17 gilts, 32 fatteners, 38 weaners and 138 piglets. Eighty farrowings were recorded giving a total of 841 piglets. The average number of piglets per litter was 10.4 and the average weaning weight was 14.2 kgs.

Sale: 21 sows, 4 boars and 149 fatteners were sold for slaughter. 441 weaners were sold to the Pig Marketing Cooperative Federation Limited.

Death: 200 piglets, 2 sows, 6 weaners and 1 fattener died during the year.

Transfer: 4 gilts, two sows and two boars were received from the Curepipe Livestock Breeding Station. Two males and 4 females Wessex Saddleback were sent to the Agricultural Services, Rodrigues.

12.14.12 *Sheep*

At the end of the year, there were 35 Rodriguan sheep on the station— 2 rams, 8 ewes and 25 lambs.

Birth: There were 14 lamblings during the year: 8 males and 11 females i.e. 1.36 lambs per lambing.

The average birth weight was 3.0 kg.

Two still born and two cases of abortion were also recorded.

Sale: 9 male lambs were sold for fattening purposes.

Death: One lamb died during the year.

12.14.13 *Rabbits*

The small rabbit unit was maintained and carried a total of 20 rabbits at the end of the year viz. 3 bucks, 4 young does and 13 rabbittlings. As rabbit breeding will be mainly concentrated at Curepipe Livestock Breeding Station, it was decided to close the unit on this station as soon as the last rabbit would have been sold.

Birth: 18 rabbittlings were born during the year..

Death: 3 bucks, 8 does and 5 rabbits died during the year.

12.14.14 *Fodder plantation on this Station*

4 acres of land were cleared during the year, out of which, one acre was planted with elephant grass and 2A50 with acacia. The sugar cane plantation along the coast was destroyed by salt sprays

12.14.15 *Fodder Supply*

(a) Collection on the Station

501 tons 874 kg of Herbe Bourrique and Pangola grass
310 tons 188 kg Elephant grass
84 tons 020 kg acacia
4 tons 373 kg Guatemala grass
6 tons 180 kg of whole sugar cane

(b) Collection from other Stations

436 tons 750 kg whole sugar cane from Mon Bois
1,075 tons 410 kg cane tops from nearby sugar cane fields during the crop season
54 tons 275 kg Herbe bourrique from Bras d'Eau
37 tons 715 kg Setaria from Curepipe Experimental Station
19 tons 050 kg Guatemala grass from the Tea Development Authority
602 tons 243 kg supplied by contractor

12.14.16 772 tons 485 kg of cattle manure and 89 tons 620 kg of goat manure were sold to members of the Public.

320 tons 270 kg of cattle manure were issued to the Forest Department.

398 tons 750 kg of cattle manure were issued to the Development Works Corporation.

23 tons 850 kg were issued to other Divisions of the Ministry.

53 tons 670 kg were used in the citrus orchard and herbe elephant plantations.

12.14.17 *Miscellaeous*

(a) Citrus Orchards

Many citrus plants were damaged during the cyclones and 64 grafts and 6 seedlings were recruited during December 1980.

27 kg 300 g of Eureka lemon and 6 kg 700 g of Bears lime harvested and sold on the Station.

(b) Onion Experiment

The Horticulture Division carried out an observation on the station. 80 g of onion seeds of the "local red" variety were sown. 290 kg 510 g of onions were harvested, out of which, 5 kg 810 g were issued to Barkly Experiment Station and the remainder sold on the Station.

(c) Coconut Orchard

The trees were severely hit by the cyclones which visited the country in early 1980.

12.15 *Poultry Breeding Centre*

12.15.1 *Senior Technical Officer—Mr. A. Pooloo*

12.15.2 The Poultry Breeding Centre maintained Parent stock of Ross Ranger and Ross Tint and introduced Parent stock of Ross Brown for the production of layers. In addition, the centre maintained Ross I broiler parent stock for the production of broiler chicks; all chicks are imported from Ross Bredeers Limited of the United Kingdom.

12.15.3 During the year, the Poultry Breeding Centre hatched a total of 352,559 chicks. 115,391 day pullets and 7,530 month-old pullets were sold to Poultry Keepers for the production of eggs.

12.15.4 To help the production of poultry meat, 78,181 day old broilers and 137,287 day old month old male chicks from laying stock were sold. 6,253.440 kilogrammes of dressed chicken and culls were sold for table. The centre also provided 77 chicken to the Animal Health Laboratory.

12.15.5 *Hybrid Ross Rangers*

A total of 123,270 Hybrid Ross Ranger chicks were produced of which 57,319 day old pullets, 2,635 month old pullets, 63,942 day old cockerels and 26 months old cockerels were sold.

12.15.6 (i) *Hybrid Ross Tint*

A total of 66,934 hybrid Ross Tint were produced, out of which 28,792 day old pullets, 1321 month old pullets, 35176 day old cockerels and 238 month old cockerels were sold.

(ii) *Hybrid Ross Brown*

A total of 79,133 hybrid Ross Brown were produced, out of which, 29,280 day old pullets, 3,574 months old pullets day old cockerels were sold.

12.15.7 *Broiler chicks*

83,222 day old broilers were produced ,out of which, 78,181were sold to Poultry Keepers.

12.15.8 *Egg Production*

602,272 eggs were produced at the Poutry Breeding Centre. The monthly production of the various breeds is shown at Table 12.32.

15.12.9 Out of the 602,272 eggs produced and the 219 eggs carried forward from the year 1979, 519,003 were incubated for the production of chicks, 42,231 were sold for table, 3,505 were issued to the Animal Health Laboratory,2,640 eggs to the Artificial Insemination Laboratory, 29,970 to the Ministry of Health, 168 to the Forest Department and 4 to the Milk Laboratory, 200 to the Civil Aviation Department and 1173 sizeless and cracked, unfit for consumption were destroyed. The stock in hand as at 31st December, 1980, was 3,597 eggs.

12.15.10 *Reproductive Performance*

352,559 chicks were hatched. The average fertility and hatchability were 83.05 and 67.93 respectively.

The monthly productive performance of all breeds maintained at the Centre is shown in Table 12.33.

The monthly reproductive performance of all parent stock breedwise is shown in Table 12.34.

12.15.11 *Import of Parent Stock*

to meet the demand for layers for the next seasons the following were imported from the United Kingdom:—

(i) Ross Ranger Parent Stock: 828 day old pullets and 128 day old cockerels;

(ii) Ross Brown Parent Stock : 829 day old pullets and 128 day old cockerels;

(iii) Ross Tint Parent Stock : 416 day old pullets and 64 day old cockerels;

For the production of broiler chicks the following were imported:—

(i) 613 day old pullets and 93 day old cockerels received on 16.4.1980.

(ii) 608 day old pullets and 97 day old cockerels received on 29.10.1980.

12.15.12 *Animal Health*

The Poultry Breeding Centre carreied an average of 30,500 birds of all ages on a monthly basis. The mortality in the adult stock during the year was 10.46%; in the young parent stock: 6.88% and in the group 0 - 5weeks: 1.75%.

TABLE 12.32

RECORDED MONTHLY EGG PRODUCTION 1980

	P.S. Ranger	*P.S. Tinted*	*P.S. Brown*	*P.S. Ross*	*Mixed Hybrids*	*Total*
January	17,032	8,407	—	11,795	1,599	38,833
February	17,276	8,732	2,574	8,461	1,307	38,350
March	25,050	13,894	11,112	8,379	1,401	59,836
April	25,561	16,209	12,311	8,777	1,171	63,849
May	17,757	18,582	9,910	15,985	1,246	63,480
June	19,773	10,107	2,568	12,418	4,248	59,114
July	13,079	9,829	12,778	12,846	4,529	53,061
August	12,128	8,299	12,577	13,078	4,438	50,520
September ...	10,896	7,439	11,383	10,989	4,133	44,840
October	10,731	7,106	11,318	11,088	4,035	44,278
November ...	9,774	6,814	9,794	15,982	3,139	45,503
December	9,361	3,903	9,053	15,225	3,066	40,608
TOTAL ...	188,418	119,141	115,378	145,023	34,312	602,272

TABLE 12.33

MONTHLY REPRODUCTIVE PERFORMANCE

	No. of eggs set	*No. Fertile*	*No. of chicks hatched*	*% of fertility*	*%hatched of fertile*	*%hatched of eggs set*
			9,681*			
January	33,103	25,821	18,043	78.00	69.87	54.50
February	28,614	23,170	16,589	80.97	71.59	57.97
March	32,381	25,393	18,623	78.41	73.33	57.51
April	70,647	59,383	45,809	84.05	77.14	64.84
May	133,921	47,098	37,882	87.34	80.43	70.25
June	50,890	45,907	38,176	90.20	83.15	75.01
July	55,236	50,615	42,280	91.63	83.53	76.54
August	38,681	35,056	29,095	90.62	82.99	75.21
September ...	46,661	41,481	34,728	88.89	83.72	74.41
October	33,434	30,186	24,392	90.28	80.80	72.95
November ...	36,447	32,507	25,480	89.18	78.38	69.90
December	16,758	14,462	10,472	86.29	72.41	62.48
	22,230**					
	519,003		351,250			

*Set in December 1979, chicks hatched in January 1980.
**Set in December 1980, chicks hatched in January 1981.

TABLE 12.34

THE MONTHLY PERFORMANCE OF ALL PARENT STOCK BREEDWISE FOR YEAR 1980

Month	*P. S. Ranger*					*P. S. Tinted*					*P. S. Broiler*				
	No. of eggs set	*No. fertile*	*No. of chicks hatched*	*% Fertility*	*% Hatched*	*No. of eggs set*	*No. fertile*	*No. of chicks hatched*	*% Fertility*	*% Hatched*	*No. of eggs set*	*No. fertile*	*No. of chicks hatched*	*% Fertility*	*% Hatched*
			3,796*					2,501*					3,384*		
January ...	15,065	12,018	8,603	79.77	71.58	7,441	5,487	4,122	73.74	75.12	10,597	8,272	5,318	78.05	50.18
February ...	13,738	11,319	8,054	82.39	71.15	6,916	5,431	3,795	78.52	69.87	7,960	6,420	4,740	80.65	73.83
March ...	14,720	11,794	8,581	80.12	72.75	7,887	6,921	4,317	87.75	62.37	7,278	5,771	4,304	79.29	74.57
April ...	28,856	24,445	19,057	84.71	77.95	17,935	14,722	11,426	82.08	77.61	9,838	8,082	5,420	82.15	55.09
May ...	22,069	19,125	15,494	86.66	81.01	13,676	11,597	9,374	84.79	80.83	7,488	6,560	4,851	87.60	73.94
June ...	19,212	16,935	14,320	88.14	84.55	9,610	8,188	7,354	85.20	89.81	10,678	9,691	7,317	90.65	75.50
July ...	15,295	13,944	12,046	91.16	78.77	11,049	10,063	8,603	91.07	85.49	14,341	13,008	10,182	90.70	78.27
August ...	10,745	9,685	8,450	90.13	78.64	5,260	4,744	3,952	90.19	83.30	11,497	10,265	7,837	89.28	76.34
September ...	12,695	11,379	9,974	92.46	87.65	7,924	7,176	6,084	90.56	84.78	12,804	11,241	8,335	87.79	74.16
October ...	9,430	8,432	7,047	89.41	83.57	5,796	5,150	4,197	88.85	81.49	8,074	7,289	5,631	90.27	77.25
November ...	8,963	7,821	6,189	87.25	79.13	4,224	3,675	2,787	87.00	75.83	14,045	12,772	10,011	90.93	78.38
December ...	4,244	3,577	2,423	84.28	67.7	1,556	1,327	923	85.3	69.55	6,868	6,051	4,586	88.10	75.78
	6,128†		3,032†								10,034†		4,690†		
TOTAL ...	181,160		123,270			99,274		66,934			131,502		83,222		

*Set in December 1979, chicks hatched in January 1980.

†Set in December 1980, chicks hatched in January 1981.

TABLE 12.34—*continued*

THE MONTHLY PERFORMANCE OF ALL PARENT STOCK BREEDWISE FOR YEAR 1980

Month	*P.S. Brown*				
	No. of eggs set	*No. fertile*	*No. of chicks hatched*	*% Fertility*	*% hatched*
January	—	—	—	—	—
February	—	—	—	—	—
March	2,496	1,752	1,421	70.19	81.10
April	14,018	12,134	9,906	86.56	81.63
May	10,688	9,816	8,163	91.84	76.37
June	11,390	10,638	9,185	93.39	86.34
July	14,551	13,600	11,449	93.46	84.18
August	11,179	10,362	8,856	92.69	85.46
September	13,238	12,193	10,335	92.10	84.76
October	10,134	9,315	7,517	91.91	80.69
November	9,215	8,233	6,493	89.34	78.86
December	4,090	3,507	2,540	85.74	72.42
	6,068†		3,268†		
	107,067		79,133		

*set in December 1979, chicks hatched in January 1980

†set in December 1980, chicks hatched in January 1981

XIII. Division of Veterinary Services

HEAD OF DIVISION: M. F. MOSAHEB, *PRINCIPAL VETERINARY OFFICER*

13.1 The Division of the Veterinary Services continued to provide Artificial Insemination and Veterinary aid to breeders. The Division was also responsible for the following activities: The running of the Animal Health Laboratory, the Health of animals on Government Livestock Breeding Stations, Prison Farms and in the Field, assisting small breeders, carrying out Tuberculin test and disease surveys, issuing import permits for items such as meat products, Veterinary certificates of health for export of live animals, meat inspection at various cold storages of imported meat and meat products.

13.1.1 The animal Disease Ordinance was enforced through appropriate quarantine measures as regards all imported stock.

13.2 *Artificial Insemination Services*

Semen from Friesian and Creole bulls was regularly collected at the Aritficial Insemination Centre and was used in the liquid state to inseminate cattle. In continuace with the Ministry's breeding Policy, Friesian semen was used to inseminate cows in Moka and Upper Plaines Wilhems areas, whereas cows in the rest of the island were inseminated with Creole semen. During the year a total of 5,604 inseminations were carried out. The average conception rate was about 55%. A group of Sugar Estates benefited from this Division, in the carrying out of artificial insemination with frozen semen, imported from Australia.

13.3 *Animal Health*

Anaplasmosis, which was endemic in certain parts of the Island, has been diagnosed in herds, previously free of this disease. The spread of the disease is mainly by flies of the genus Stomoxys, which transfer the parasite *Anaplasma marginale* mechanically from animal to animal through bites. Steps are bkeing taken to control the fly population, and movement of animals from affected herds are closely monitored.

13.3.1 *Brucellosis*

A survey of Bovine Brucellosis, which started last year, is still in progress on Government Livestock Breeding Stations, on herds belonging to the Private Sector and on clinical cases, reported from small breeders.

400 serum samples and 15 milk samples were subjected to Brucellosis test and only one positive case was diagnosed—Serologically and by bacteriological culture.

13.3.2 *Bovine Respiratory Diseases*

Studies have been undertaken to evaluate whether it would be advisable to recommend vaccination against Infectious Bovine Rhinitracheitis, Bovine Virus Diarrhoea and Para-Influenza—3 in feedlots. 500 Bovine Serum samples have been submitted to France under the "Commission Mixte Franco-Mauricienne", as part of the Pathological Survey undertaken by Mr. Barre (of the above commission) in collaboration with this Division, in order to assess the prevalance of these diseases in Mauritius.

13.4 *Veterinary Aid*

In addition to cases attended on Government Stations, 4866 cases requiring Veterinary Aids were attended in the field. This included 22 cases of enucleation of ovarian cysts, 478 cases or pregnancy diagnosis, 402 cases of calcium and phosphorus deficiencies, 411 cases of mastitis, 313 of dystokia, 789 cases of digestive disorders and 2451 miscellaneous cases like abscesses, injuries and minor treatments.

13.5 *Animal Health Laboratory*

The Animal Health Laboratory was mainly concerned with *(a)* general diagnostic work *(b)* vaccine production and *(c)* sterilisation of livestock products.

13.4.1 *General Diagnosis*

A total of 3146 specimens were submitted to the Laboratory for pathological, bacteriological, parasitological, Biochemical and haematological examinations. These included live animals, animal carcasses, blood, milk, swabs, stool samples and skin scrapings and were submitted by Government Stations, private owners and Police Authorities.

13.5.2 *Vaccine Production*

The following poultry vaccine were produced:

Type of Vaccine	*No. of doses produced*	*No. of doses sold*
Fowl Pox ...	... 341,790.—	162,925.—
Newcastle Disease (La Sota Strain)	... 161,400.—	110,453.—
Newcastle Disease (Hitchner B_1 Strain)	... 646,000.—	251,106.—

A total of 17,985 doses of poultry vaccine was supplied to the Poultry Breeding Centre and to the Ministry of Co-operatives.

Three poultry vaccinators of the Animal Health Laboratory carried out vaccinations for small breeders.

13.5.3 *Sterilisattion of Livestock Products*

604 specimens including raw hides articles, stuffed animals and animals' hides were submitted to the Laboratory, where they were sterilised, prior to release to various importers.

13.6 *Enforcement of Animal Disease Ordinance*

To prevent the introduction of exotic diseases and, at the same time, to maintain the low incidence of animal diseases in the country, the provisions of the Animal Disease Ordinance were rigidly applied to all imports of animal and animal products. The quarantine kennels, the catteries, both at Reduit and the MSPCA Rose Hill, the poultry quarantine unit at Reduit, the quarantine station at Roche Bois and the various authorised quarantines on Sugar Estates and Poultry Farms were maintained.

13.7 *Importation of live animals*

57 ships and 55 aircraft bringing live animals were inspected by the Veterinary Officers and all the animals after landing including cage birds and pets were quarantined at the various stations. The imports were as follows:—

13.7.1

Country of Origin		*Cattle*	*Sheep & Goats*	*Pigs*
Rodrigues	...	408	5798	2951
South Africa	...	8239	150	—
Australia	...	—	999	—

13.7.2 In addition to the above, 18 dogs, 255 cage birds, 47 horses and 51068 day-old chicks were received from various countries.

13.8 *Livestock Products*

During the year, 1441 import and 408 landing permits were issued. All frozen meat and meat products landed were subjected to Veterinary inspection at various cold storages, prior to release for sale. The list of miports has been as follows:—

Products		*Quantity* kgs
Frozen beef and beef products	...	2,510,474.4
Frozen mutton, offals and preparations	...	2,026,335
Frozen pork and pork products	...	103,327
Frozen goat, meat and offals ...	...	70,975
Frozen turkeys, ducks and Products	...	7,140
Livestock feeds (poultry, pig, dog, rabbit, pheasant, horse and ducks)	...	1,899,500

13.9 *Slaughter data*

During the year, 28 calves, 462 cows and 780 bulls of the milch breed were slaughtered, yielding 163,914 kgs of beef. In addition, 150.7 herd cattle and 446 cattle imported from Rodrigues were slaughtered, yielding 344,801 kgs of beef. Further 1,319,598 kgs of beef were obtained from 6,608 steers and bulls imported from South Africa and 1615 bulls were authorised slaughter on religious ground (Hakeeka and Eid-Ud-Doha).

13.9.1 Likewise, 3,005 local sheep (including Rodrigues), 13,033 local goats (including Rodrigues), 600 Imported sheep and 99 Imported goats from South Africa were slaughtered, yielding 135,216 kgs of meat. 9019 pigs, including those imported from Rodrigues, were slaughtered, yielding 587,842 kgs of meat.

13.9.2 The slaughter house returns revealed the following average carcass weight of imported and local cattle slaughtered during the year:—

	kgs
Local herd cattle	189.2
Local milch co w	138
Local bulls of milch breed ...	126
Calves of local milch breed ...	80
Rodrigues cattle	134
Australian cattle	—
South African cattle	200

13.9.3 From the meat inspection returns, no partial seizures on account of bovine tuberculosis were reported from the Central Slaughter House.

13.9.4 In addition to the above, 24 cases of alleged illegal slaughter, 15 cases of alleged cruelty to animals and 5 cases of animals involved in accidents, were examined and reports sent to the police department.

13.10 *Advisory services*

Large and small livestock breeders continued to benefit from advice on management and health provided by the Veterinary Officers. Veterinary Officers also gave talks on Television and to young farmers on cow rearing.

13.11 *Staff movement*

(i) The Principal Veterinary Officer was sent by the Government to Anand, India, to attend a conference on Veterinary Services to small farmers.

(ii) Veterinary Officer Sibartie returned to Mauritius after successfully completing his MVM Degree at Glasgow University, Scotland.

13.12 *Death and retirement*

It was with regret that deaths of three Senior Technical Assistants namely B. Mohabirsingh, R. Bhoyroo and D. Gowrea were recorded at the Division of Veterinary Services.

Driver H. Ramsaha retired from the Service.

13.13 *New appointment*

B. Neerunjun and D. Meenowa, both graduates in Veterinary Science, joined the Division as Veterinary Officers.

13.14 *Revenue*

		Rs	
	Veterinary fees ...	18,331.00	
(AHL)	Sale of vaccines ...	33,264.33	
	Quarantine fees ...	76,749.12	
	Adv. a/c: Dogs ...	1,375.00	
	Import Permit Fees ...	8,224.25	
(AHL)	Miscellaneous ...	2,419.20	(Sterilisation, Post Mortem fees, Blood analysis, etc.)
	Sale of Drugs ...	—	
	TOTAL ...	166,630.82	

XIV. Dairy Chemistry Division

HEAD OF DIVISION: P. MARDAMOOTOO—DIVISIONAL SCIENTIFIC OFFICER

14.1 During the year under review, the Diary Chemistry Division undertook a detailed analysis of milk samples, collected from cows, which were on three different experiments run by the Animal Production Division. These experiments involved:—

(i) the *ad libitum* feeding of molasses/urea mixture at Palmar and Richelieu Livestock Breeding Stations (LBS)

(ii) The feeding of 3 kg of molasses at Palmar Livestock Breeding Station and

(iii) the feeding of different levels of molasses/urea mixture at Richelieu Livestock Breeding Station.

The objective of these experiments were to determine the effects of molasses/urea mixture on milk composition, particularly fat and protein. The Division also underlook the monitoring of bulk milk from the three Livestock Breeding Stations and some sugar estates. Samples of locally processed milk and milk products such as pasterised milk, yoghurt, cheese, cream, ghee and butter were analysed. Towards the end of the year, a systematic survey of mastititis was started.

14.2 Technical assistance, whenever sought for, was provided to the private sector in the production and analysis of milk and milk products. Milk samples from individual cowkeepers and the public were analysed on request.

14.3 The Divisional Scientific Officer or the Scientific Officers, delegated by him, represented the Ministry of Agriculture, Natural Resources and the Environment on the Technical Committee of the Mauritius Standards Bureau and the Sub-committee for cattle.

14.1 The Division undertook all the analytical work on milk and dairy products arising from the research programme of the Animal Production Division (APD)

14.4.1 *The effects of ad libitum feeding of molasses/urea mixture on mllk composition*

S. Ramessur, P. Panday, and Puttoo

One hundred and eighty-five individual cows' milk samples, collected over a five-month period from Palmar and Richelieu Livestock Breeding Stations, were submitted for analysis by the APD in connection with its study of the effects of molasses/urea mixture on milk composition. The daily ration of each lactating cow, in this experiment, consisted of 4% body weight of acacia (*Leucaena leucocephala* L.), 500 g cotton seed cake and minerals. Molasses/urea mixture was given *ad libitum*. In Table 14.1 representative data from this study are given.

TABLE 14.1

EFFECTS OF 'AD LIBITUM' MOLASSES/UREA MIXTURE ON MILK COMPOSITION

Results presented are the average for the month of April, 1980

Parameters Investigated (%)	*Cow No.*								
	Palmar LBS					*Richelieu LBS*			
	BL 39	*BL 47*	*BL 92*	*BL 97*	*A 482*	*13/304*	*151*	*484*	*372*
Fat	1.76	0.87	0.50	0.90	0.61	3.65	1.81	2.39	0.82
Protein ...	3.06	3.22	3.90	3.35	3.32	2.84	2.88	3.26	3.16
Total Solids ...	10.20	9.42	9.88	9.55	9.56	11.90	10.28	11.35	9.55
Lactose ...	4.76	4.00	4.44	4.00	4.35	—	—	—	—

Analysis of the data, generated during the whole period the experiment was in progress, shows that the lactose and protein levels were normal. This was to be expected from the high carbohydrate (molasses) and protein or pre-protein source in the diet. However, the percentage of fat in the milk samples was well below generally accepted norms, which by the way accounts for the low total solids. Possible explanations for this effect could be (i) low level of crude fibre and/or (ii) a low pH of the rumen fluid. It is well documented that lush foliage, with a low fibre content, decreases the rate of salivation. The net effect would be a fall in the acetate to proprionate ratio which would result in a decreased milkfat. If this in fact had been the case, the situation could have been remedied by supplementing the diet with a rich source of fibre.

14.4.2 *The effect of molasses on milk composition*

During the third quarter of 1980 ,two individual and two bulk milk samples from two different pens from Palmar LBS were submitted once weekly by Scientific Officer, P. Teeluck, in connection with the study of the

influence of molasses on milk composition. The lactating cows in this study were divided into groups. The controlled group was fed concentrate and fodder. The experimental group of animals were fed concentrate, fodder and molasses at 3 kg/head/day. The average monthly results are presented in table 14.2.

TABLE 14.2

EFFECTS OF MOLASSES ON MILK COMPOSITION

	Control Group				*Experimental Group (Molasses 3 kg/head/day*			
	Total Solids %	*Fat %*	*Protein %*	*Lactose %*	*Total %*	*Fat %*	*Protein %*	*Lactose %*
September ...	11.65	3.01	3.17	4.19	11.32	4.15	3.10	3.72
October ...	11.48	3.45	2.90	3.85	12.86	5.52	3.16	3.75
November ...	10.21	2.63	2.97	4.08	12.12	4.45	3.31	4.12
December ...	12.63	3.44	3.10	4.11	12.03	4.22	3.30	4.09

The data obtained show that molasses had a marked effect on the fat content of milk. When the animals were fed 3 kg molasses/head/day, the fat content of milk was increased by 47% (range 23 to 69%). The increase in fat % observed can be accounted for by the higher energy source and probably associated with a high fibre content. It is to be noted that the milk-fat% of the control group was higher than that obtained in the previous experiment (14.4.1) when acacia was the sole source of fibre.

At the level at which molasses was fed, no significant effects were observed on protein and lactose. The nitrogen content of molasses is low (0.6 to 0.9%) and is unlikely to have any significant influence on the milk protein. The lactose content of milk is also unlikely to be influenced by the diet as the overall osmolarity of blood and milk components have to be maintained.

14.4.3 *Influence of molasses/urea mixture at various levels on milk composition*

As from September, 1980, 17 bulk milk samples from 17 different pens were collected once weekly for analysis. The objective of the experiment, which was set up by Scientific Officer, G. Naidoo at Richelieu Livestock Breeding Station, was to determine the optimum level at which molasses/urea mixture was to be fed to lactating cows. Cows in pen number 1 to 5, 6to 10, 11 to 15and16 to 20 were fed 3, 2, 1 and 0 kg molasses/urea mixture/head/day respectively. Table 14.3 gives the monthly average milk fat content from the four groups.

TABLE 14.3

INFLUENCE OF MOLASSES/UREA MIXTURE AT VARIOUS LEVELS ON MILK FAT

Monthly average results for the four treatments

Pen No.	*Wt. of molasses/urea mixture (kgs)*	*% milk fat*			
		Sept.	*Oct.*	*Nov.*	*Dec.*
1 to 5	3.0	4.08	4.57	4.76	4.53
6 to 10	2.0	3.83	3.90	—	4.22
11 to 15	1.0	2.52	3.67	3.92	4.18
16 to 20	0.0	2.54	3.27	2.94	2.51

Table 14.3 shows that the % milk fat increases as a result of feeding increasing amounts of molasses/urea mixture to the animals. A complete statistical analysis of the data obtained showed that there was no significant difference in the group fat % at the 90% confidence.

It is to be noted that the roughage used in this experiment was cane tops and *Setaria Sphacelata* which have a slower flow rate in the rumen than acacia. The effect of molasses over the basal diet would be expected to increase the rumen acetate and hence account for the increase in milk fat%.

Milk protein and lactose were not significantly influenced (data not presented) as a result of feeding increasing amounts of molasses/urea mixture.

14.5 *Monitoring of bulk milk from the Livestock Breeding Stations and Sugar Estates.*

S. Ramessur, P. Panday, M. Mudhoo, M. Puttoo

Two hundred and eighty-seven samples of bulk milk were collected twice weekly from Curepipe and Richelieu Livestock Breeding Stations and once weekly from Palmar Livestock Breeding Station with a view to monitoring their chemical and bacteriological qualities. The results of these analyses are presented in Table 14.4.

At the request of Union Ducray and Mon Désert Mon Trésor Sugar Estates, samples of bulk milk were analysed once weekly. The cows, reared in feedlots, were fed as follows:—

(i) Cane tops and elephant grass

(ii) Cow feed at 4 kg/head

(iii) Chicken litter and molasses *ad libitum*

The results are presented in Table 14.4.

TABLE 14.4

RESULTS OF ANALYSIS OF BULK MILK SAMPLES FROM LIVESTOCK BREEDING STATIONS AND SUGAR ESTATES

Station	*Total No. of samples*	*% of Samples*				
		Fat% <3%	*Protein% <3%*	*Total Solids% <11.5%*	*Coliforms >10³/ml*	*Total Bacteria >10⁵/ml*
Curepipe LBS						
Bulk Morning ...	80	23.8	41.3	40.0	68.8	53.0
Bulk Evening ...	88	3.4	33.0	3.4	62.5	52.3
Palmar LBS[a]						
Bulk Morning ...	68	50.0	35.5	64.7	92.6	80.9
Richelieu LBS[a]						
Bulk Morning ...	51	29.4	3.92	54.9	100	100
Union Ducray						
Bulk Morning ...	28	10.7	14.3	14.3	—[b]	—
Mon Désert Mon Trésor						
Bulk Morning ...	23	8.7	8.7	0.0	—	—

(a) At Palmar and Richelieu Livestock Breeding Stations, the animals were milked only once daily.

(b) The bacteriological quality of the samples could not be assessed with certainty as the samples were not refrigerated between the time of sampling and delivery to the laboratory (approximately 6 hours).

The data presented in Table 14.4 show that chemically and bacteriologically the milk from the Livestock Breeding Stations were very poor in quality. The quality of milk obtained by twice milking was comparatively better (both chemically and bacteriologically) than milk obtained by once milking. Milk produced on the Sugar Estates were chemically better than milk produced from Government Stations. The probable reason for this could be that the animals from the Sugar Estates were on a higher plane of nutrition.

14.6 *Monitoring of Dairy Products*

P. N. Rangasamy, S. Ramessur and M. Puttoo

During the year, the Division established closer relations with local manufacturers of dairy products. Technical assistance was given to Maurilait Ltd. for the production and improvement of a fermented milk product.

Forty-two samples of locally processed dairy products such as pasteurised milk, cream, yoghurt and cheese were collected at random and analysed. All the dairy products investigated fell short of the minimum acceptable standards. For example, in pasteurised milk, the fat and protein were generally less that 3%. In yoghurt, the fat % was generally less than 1% but titratable acidity was always higher than expected norms.

The bacteriological quality of the products were far from satisfactory. On the basis of the phosphatase tests it appeared that pasteurisation was effectively carried out in the case of pasteurised milk, cream and other products. The deterioration in bacteriological quality of tthe products seemed to be due to post-pasteurisation contamination. For instance, coliform organisms were almost always detected in pasteurised milk and yoghurt.

14.7 *Survey of Mastitis in Mauritius.*

Towards the end of the year, a survey of mastitis was started at Richelieu Livestock Breeding Station and it is proposed to extend this work to cover all livestock Breeding Stations in the course of 1981.

Aseptic milk samples were collected from individual quarters of the cows tested. The samples were then examined bacteriologically by standard procedures. All cows were sampled at least thrice within a two-week interval. If the same pathogen was isolated from the same quarter on at least two consecutive occasions, that quarter was considered as being infected. Table 14.5 gives the results obtained with Pen No. 13 at Richelieu Livestock Breeding Station.

TABLE 14.5

RESULTS OF MASTITIS SURVEY AT RICHELIEU LBS

Cow No.	*Udder Quarter*			
	Front-right	*Front-left*	*Rear-right*	*Rear-left*
	Pathogens Isolated			
34	S.e*	Nil	Nil	S.e
167	Nil	Nil	Nil	S.e
174	S.e	S.e	S.e	Nil
280	S.e	Nil	Nil	S.e
324	Nil	S.e	Nil	Nil
369	S.e	S.e	Nil	Nil
382	Nil	Nil	Nil	Nil
477	S.e	Nil	S.a†	S.e
771	S.e	Nil	Nil	S.e
786	Nil	Nil	Nil	Nil

* S.e *Staphylococcus epidermidis*

† S.a *Staphylococcus aureus*

The results obtained show that 80% of the cows examined were infected with staphylococci. This is a very high rate of infection by any standard. This situation can be remedied by instituting better management practices such as (i) using teat-dips (ii) drying the teats before milking (iii) dipping teat-cups in a sanitizing solution or in hot water before use (iv) culling cows with a history of mastitis or which do not yield to treatment and (v) dry cow therapy. Although all the infections detected were at a sub-clinical level, occasional flare ups of clinical cases cannot be ruled out.

14.8 *Staff movement*

14.8.1 Scientific Officer, P. Mardamootoo, resumed duty on the 15th of October 1980, after completing a Ph.D in Dairy Science at the University of Illinois.

14.8.2 Scientific Officer, J. Ng Man Sun, also resumed duty on the 15th October 1980 on the successful completion of an MSc. Course in Dairying at the University of Reading.

14.8.3 Scientific Officer, P. N. Rangasamy, acted as Officer in Charge (Dairy) from January 1980 to the 14th October, 1980.

14.8.4 Technical Officer, M. Puttoo, resumed duty on the 22nd May, 1980, after successfully completing a BSc Course in Agriculture at the University of Mauritius.

XV. Extension Service Division

HEAD OF DIVISION: S. P. MAUREE, DIVISIONAL SCIENTIFIC OFFICER

15.1 *Staff Position*:

At 31st December 1980, the staff position at the Division was as follows:—

Divisional Scientific Officer ...	1
Scientific Officer	2
Agricultural Superintendent	2
Senior Technical Officer	11
Technical Officer	29
Senior Field Assistant	2
Field Assistant	29
Executive Officer	1
Clerical Officer	1
Typist/Stenographer	2
Clerical Assistant	5
Agricultural Assistant	1
Technial Assistant	4
Publicity Assistant	1
and Office Attendant	4

15.2 *Movement of Staff*:

(a) Mr. S. P. Mauree who went to take charge of the Land Use Division on 8.1.80 joined the Division again as Divisional Scientific Officer on 19.8.80 when Mr. R. Brunet assumed his new position as Principal Agricultural Officer.

(b) Scientific Officer, (Agronomy) O. Bissonauth attended the 12th International Seminar on Vocational Training in Agricultural in Switzerland from the 13th July to the 17th August.

(c) Scientific Officer, (Entomology) Dr. M. Ramsamy, joined the Division on the 26th September.

(d) Technical Officer, R. Rajcumar, followed a five-month course on "Animal Production and Health" in Egypt from February to June 1980 and he resumed duty on 25th July.

(e) Technical Officer, H. Chummun attended a five-month course on "Extension and Cooperative Agricultural Services" in Cairo, Egypt from the 30th June to the 30th November; he resumed duty on 8.12.80.

(f) Technical Officer, S. Chung Ting Wan also followed a five-month course in Cairo, Egypt, at the same time as Technical Officer H. Chummun. But he resumed duty on 27.12.80.

(g) Senior Technical Officer R. Gohabar followed a 6-week course on "Agricultural Exttension and Rural Development" in Italy from the 8th September to the 17th October.

(h) Clerical Officer, Georges Ramiah, was transferred to the "Animal Production Division" and was replaced by Mr. M. Gunputh.

(i) Typist/Stenographer, Mrs. J. Perichon was transferred to the Finance Division and was replaced by Mrs. B. Muneshar.

(j) Clerical Assistant R. Muckoon was transferred to the Royal Botanic Gardens and was replaced by C. Dewkurrun.

(k) Messrs M. Gunputh and N. Chummun joined the Division as Agricultural Trainees on 17.4.80

(l) Field Assistant, R. K. Jootun went to work in Rodrigues on 10.10.80.

(m) Field Assistant I. Abbana left for a new position as Trainee Social Security Officer in the Ministry of Social Security on 16.10.80.

(n) Field Assistant Lang Ping Nam left in February.

15.3 *Boards and Committees*

The Divisional Scientific Officer sat on the following Boards/Committees during the year:—

(a) Irrigation Committee.

(b) Onion and Garlic Committee at the Agricultural Marketing Board.

(c) Sugar Planters' Mechanical Pool Corporation.

(d) Potato and Onion Committee at the Agricultural Marketing Board.

(e) National Federation of Young Farmers' Clubs.

(f) Rural Development Committee for New Zealand Cattle.

(g) Price Fixing Committee, Mauritius Meat Authority.

(h) Rice Committee at the Agricultural Marketing Board.

(i) Pesticide Control Board (Ministry of Health).

(j) Land Settlement Committee.

15.4 *Field Visits*

Crops

Senior Technical Officers and Technical Officers paid 13,853 visits to planters, of which 3,352 were to sugarcane growers.

Livestock

Some 3,970 visits were paid to cowkeepers, goat, rabbit, Poultry and pig breeders.

During those visits, advice was given on the methods of crop cultivation, pest and disease control, management, housing and feeding of Livestock.

15.5 *Group Meetings*

522 group meetings were organised by officers for professional farmers and these were attended by 5,441 farmers. These include 252 talks on various aspect of sugarcane cultivation which was attended by 2,304 sugarcane planters. The other talks comprised topics on foodcrops, tea, livestock and pest disease control.

15.6 *Field Demonstrations*

125 Demonstrations were carried out in planters' fields on the use of insecticides, fungicides and weedlcides. Most of these were carried out on major crops viz sugarcane, potato, tomato, onion, though other crops like carrot, brinjal, beans and fruit trees, etc., were also treated.

These demonstrations were arranged jointly with the Pesticide Control Unit and field officers.

Further, the following fertiliser demonstrations were set up in planters' fields: 22 on sugarcane and 13 on foodcrops, tea and fruit trees.

15.7 *Statistics and Surveys*

Several surveys were undertaken as necessitated by new conditions that developed as well as routine work of the Division:—

(a) Surveys of new plantations following Cyclone "Claudette" and torrential rains that accompanied Cyclone Hyacynth" and damage caused by Cyclone "Laure" in March, were effected.

(b) Monthly assessment of foodcrop production.

(c) Weekly recording of Market Prices of vegetables.

(d) Assessment of damage caused by weedicides on crops.

(e) Survey of areas under potato, onion, and garlic and their production for the *Agricultural* Marketing Board.

(f) Survey of potato diseases (See Section 12.2).

15.8 *Agricultural Youth Movement*
Agricultural Youth Clubs

By the end of 1980, the number of Agricultural Youth Clubs was 82 with 2,505 members and associate members, six Regional A.Y.C. Federations viz Pamplemousses/Rivière du Rempart, Flacq, Moka, Plaines Wilhems/Black River, Grand Port and Savanne were organised; further one National Committee—the Mauritian Council of Agricultural Youth Clubs was instituted with representatives of the Federations.

Field Assistants paid 1,452 visits to the various clubs and held 475 meetings with the members. The Senior Technical Officer and the Senior Field Assistant paid 85 and 75 clubs visits respectively.

A.Y.C. members had altogether 925 kitchen garden projects, 313 rabbit projects and 137 poultry projects. 70 clubs participated in the Agricultural Competition, conducted by the Division. After assessment, winners were designated.

The other activities of the Youth Section were:—

(a) Conduct of an Essay Competition on "The Role of AYC in Mauritius" in which 35 members took part.

(b) Demonstration on Rabbit Hutch Construction at the 4 Demonstration Centres.

(c) A series of seven lectures in elementary agriculture was held at the four Permanent Demonstration Centres and Réduit and were attended by 84 members.

(d) A football tournament was organised at the level of Regional A.Y.C. Federations.

(e) An A.Y.C. training course was held for new committee members at Pointe Jérome and was attended by 115 members.

At the request of A.Y.C. members some work in the promotion of Apiculture was started; this work, on account of its general interest, had to be extended to the general public concurrently.

Four beehives were distributed to each of the following: Chemin Grenier A.Y.C., Cascavelle A.Y.C., Mayflower A.Y.C. and L'Espérance Trebuchet A.Y.C.

Five talks on Apiculture, with film shows were delivered to A.Y.C. members, 12 to other youth organisations and 1 to both members of the public and A.Y.C. Altogether 1,600 persons attended the talks.

300 pamphlets on "The list of melliferous plants" and "Notes on Apiculture" were distributed to Agricultural Youth Clubs and members of the public.

Young Farmers

Technical Officer, J. Chummun was posted at the National Federation of Young Farmers for advisory work.

He provided advice in connection with the Training Centre-Belle Mare Project, Poultry Project and the Rabbit and Goat Projects.

He also helped in planning and running the National Kitchen Garden Competition organised by the National Federation of Young Farmers.

The Technical Officer delivered talks on agriculture in 3 seminars that were organised by the Federation.

He was a member of the Potato Committee at the Agricultural Marketing Board, representing the Federation.

15.9 *Information Section*

2,250 copies of Farming News were prepared and distributed monthly to members of the public and to farmers in particular.

40 T.V. talks were delivered by Extension Officers on Thursdays on various topics.

45 Radio talks were also presented on Wednesday evenings in Creole and 44 in Bhojpuri. Furthermore as from May 1980, a special series "Le Jardinage chez soi" was started and was presented every Friday during "Le Programme des Menageres on "Radio. 33 such talks were delivered.

The following publications were distributed to members of the public on request:—

Guide de Cultures Vivrières: 3,500; Poultry Keeping: 91; Rabbit Keeping 53; Cow Keeping: 6; Goat Rearing: 55; Fruit Tree Growing: 38; Onion Cultivation: 3; Sericulture: 3; Rice Cultivation: 3; Coconut Growing: 2; Sugarcane Cultivation: 60; Groundnut Cultivation: 4; Maize Cultivation: 3; 100 bound copies of 1979 Farming News were issued and 50 of these were put on sale at the Demonstration Centres.

57 requests for advice were received by the Information Section from either farmers and members of the public in general by telephone, in writing or in person, and these were conveyed to the Extension Officers concerned for appropriate action.

15.10 *Audio Visual Section*

This Section was responsible for the printing of Farming News, booklets, leaflets, etc., for distribution to the farming community and the members of the public in general; hence some 2,250 copies of Farming News were printed monthly. A booklet on "Egg Production" was also published.

The Section provided the audio visual support viz (Caption, charts, slides and film projections) for the talks on T.V. and group meetings.

15.11 *Demonstration Centres and sub offices*

Besides the four Permanent Demonstration Centres at Flacq, Rivière des Anguilles, Plaisance and Mapou, there are 12 sub offices viz Arsenal, Long Mountain, Triolet, Abercrombie, Rivière du Rempart, Bel Air, St. Pierre, Wooton, Rose Belle, Vacoas, Bambous and Bassin.

About 1,346 planters and breeders called at the centres and sub offices for advice and information.

The value of sales of produce on the Demonstration Centres during the year was as follows:

	Rs
Plaisance Demonstration Centre	20,742,32
Mapou Demonstration Centre	40,308.95
Rivière des Anguilles Demonstration Centre	21,704.88
Flacq Demonstration Centre	45,108.60

Produce sold consisted of vegetables and cuttings, grown on these centres, goats and rabbith, etc., thus 100 goats of Anglo Nubian and Jumna Pari breeds and 24 rabbits were sold for breeding.

Furthermore, 31 female goats and 11 female rabbits were brought by breeders for service by the male stock of the stations. Sweet potato and cassava cuttings, banana suckers and elephant grass for planting were given free to 61 farmers.

The Scientific Officer carried out the following demonstrations on the Centres:—

(i) Onion varieties: Texas Early Grano, Local Red and Pyramid.

(ii) Sowing of onion seeds in April and May with a view to demonstrate the optimum time in March.

(iii) New tomato variety FP1

(iv) Potato varieties viz Up to Date Imported and Local seeds, Eba and Spunta.

(v) Potato variety Delaware for observation on performance.

(vi) Tomato varietal demonstration with local Pomme d'amour, FP1 and Vc Venus.

(vii) Vegetable varieties from Chinese Agricultural Technical Team viz: cucumber, cowpea, bittergourd, ribbed gourd and calabash.

(viii) Observations on the effect of the foliar fertilisers MF 134, MF 135, MF 136 on pine apple, tomato and voehm.

15.12 *Pests and diseases in the fields*

15.12.1 *Soft Rot in Ginger*

Severe incidence of nematode *Meliodogyne javanica* was found in roots, rhizomes and soil around affected plants from samples submitted to and analysed by the Plant Pathology Division; further investigation is, however, required on the effect of the nematode.

15.12.2 *"Liriomyza trifolii" (leaf miner) and viruses X and Y on Potato*

The leaf miner caused great concern to potato growers but gradually many of them were successful in controlling the insect with the insecticide "Tamaron"; a total control of the insect was obtained at Mapou Demonstration Centre with this insecticide.

A high incidence of Virus Y was also noticed in the first season in Local Up to Date plantations. It also appeared that fields under Local Up to Date seeds, in which there was a high incidence of Virus Y, were more susceptible to *Liriomyza trifolii* than other fields; plantations from Local Up to Date seeds showed about 36% of Virus diseases and 39% of leaf damage from the leaf miner, while plantations from Imported Up to Date seeds showed about 2% of Virus diseases and 21% of leaf damage from the leaf miner. Yield losses were estimated at 33% in plantations from Local Up to Date seeds and about 7% in plantations from Imported Up to Date seeds.

Furthermore, a high percentage of soft rot was reported in Local Up to Date seeds; in some cases, 50% of soft rot was reported.

Scab was present to about 10% on harvested potatoes, though in certain fields, infection reached 40%.

Many fields were found severely affected by Bacterial Wilt especially in the Southern part of the island during the first season. Blight infection occurred as usual.

15.12.3 *"Liriomyza trifolii"* on other crops

Besides potato, many other crops were affected to various extent by the insect viz: tomato, brinjal, voehm, brede de Chine, ladies finger, beans and creepers.

4 Bacterial Wilt on tomato and brinjal

5 Nematodes, pink root and blast in onion, and Fusarium sp. on onion inflorescence in some fields.

6 Purple Blotch in garlic.

7 Phomopsis sp. on brinjal.

8 Rust and pod rot (Sclerotinia sclerotiorum) in beans.

9 Mole cricket in some cauliflower and potato fields.

10 Heart rot of coconut plants in some localities.

11 Thrips of a new species on lettuce.

12 Smut on sugar cane varieties M 377/56 and M 376/64 in some fields in the North.

13 Chlorotic streak on sugarcane variety M351/57.

14 Recurrence of Rhinoceros beetle attack on coconut.

15.13 *Request and Complaints from Farmers*

(i) There were again repeated complaints about the high prices of fertilisers.

(ii) Breeders complained that because of frequent and extensive use of weedicides, fodder was becoming scarce and also that price of milk obtained by them is too low. Further, some breeders in the South stated that there was herbicide drift from Estate lands to Crown Lands where fodder is collected.

(iii) Several complaints of herbicide damage to crops were recorded, especially during the first quarter. The widespread use of weedicides on Estate sugarcane fields, adjoining foodcrop plantations in many cases was the main cause for complaints. The matter was officially brought to the attention of the Chamber of Agriculture. 29 cases were reported and were investigated by Extension Officers during the year.

(iv) Some planters complained that their cane harvest is delayed on account of problems of transport, labour and fixed cane quota for delivery to the mills during harrvest period.

15.14 *Miscellaneous Assistance*

34 talks on various topics like Kitchen Gardening, Poultry Keeping, Cow Keeping and Rabbit Keeping were delivered by Extension Officers to members of the Staff of the Ministry of Social Security, l'Amicale de Curepipe and several other organisations. These talks were attended by 1,334 persons.

Furthermore, the Senior Technical Officer of the Information Section gave 2 talks to the Mauritius Girls' Guide on Kitchen Gardening and 3 to C.C.S. Secretaries at the Cooperation House on "The Role of the Extension Service in the Life of Planters."

64 soil samples were taken from fields of sugarcane planters, sent to the Chemistry Division for analysis of pH, phosphate and potash. After interpretation, planters were advised on appropriate fertilization.

15.15 *Floods and Cyclone "Laure"*

As a result of the torrential rains that accompanied Cyclone "Hyacynth", which stayed in the vicinity of the island from 24.1.80 to 28.1.80, the new foodcrop plantations made after Cyclone "Claudette" suffered a severe setback.

Crops that were most affected were pomme d'amour, beans, seedlings, some creepers, chillies, cabbage and petsaï.

In many cases, tomato, bean and chilly plantations were completely washed away.

Subsequently, the rains accompanying Cyclone "Jacynth" in February 1980, also caused similar damage to existing plantations.

The yield losses due to both "Hyacynth" and "Jacynth" were reported to be ranging from 25%—50%.

Cyclone "Laure" which occurred in March 1980, caused little damage to foodcrops and sugarcane; few crops however were affected to a significant extent viz: tomato by 20%, maize by 23% and beans by 35%.

15.16 *Staff Meetings*

Weekly meetings were held with the Senior Technical Officers on Tuesdays at Reduit. As from the end of November, all Technical Officers also attended these meetings during which the preparation of the programme of work for 1981 was discussed.

Senior Technical Officers also held weekly regional staff meetings with their officers at their sub offices.

15.17 *Foodcrop Production*

TABLE 15.1

ESTIMATED FOODCROP PRODUCTION IN 1980

CROP	*Area Harvested (Arp)*		*Estimated Average Yield (Kg/Arpent)*		*Estimated Total Commercial Production (Metric Tons)*	
	1979	*1980*	*1979*	*1980*	*1979*	*1980*
Maize	1110	773	1055	947	1171	732
Manioc	21	12	8666	7166	182	86
Arouille	24	37	5041	4648	121	172
Sweet Potato ...	20	14	5250	6071	105	85
Groundnut ...	663	683	1632*	1568*	1082*	1071*
Irish Potato ...	1271	1674	6553	6985	8329	11694
Beans and Peas ...	570	836	1586	1390	904	1162
Pine apple ...	84	64	5381	4031	452	258
Brinjal	92	119	5728	4815	527	573
Tomatoes ...	1895	1468	4411	4169	8359	6121
Ginger	66	65	5863	5354	387	348
Creepers	982	1267	5583	4822	5483	6110
Mixed Vegetables ...	1185	1382	6011	6117	7123	8454
Banana	692	605	9628	4339	6663	2625
Rice	17	88	2235	1807	38	159
TOTAL ...	8682	9087	—	—	40926	39650

The acreage shown above were effective acreages harvested and include the acreages of different crops grown on the same land in one year as well as foodcrops inter-planted with sugarcane.

* Fresh weight

XVI. Engineering Division

HEAD OF DIVISION — A. R. SATAR, PRINCIPAL AGRICULTURAL ENGINEER

16.1 The division consists of 3 sections:—

(i) Farm Machinery.

(ii) Farm Buildings.

(iii) Irrigation, Soil and water conservation and Drainage.

16.2 The Farm Machinery Section is responsible for:—

(i) The design of agricultural equipment.

(ii) Testing of imported equipment and carrying out modifications if necessary.

(iii) Advice to other divisions on the selection of equipment.

(iv) Installation and commissioning of plants, equipment etc. on experimental stations.

(v) Manufacture and installation of structural members for farm buildings.

(vi) Repair and maintenance of vehicles and equipment.

16.3 The Farm Building Section is responsible for the design and construction of farm and office buildings.

16.4 The Irrigation, Soil and water conservation and Drainage Section is responsible fo rresearch and design in the field of Irrigation, Soil and water conservation and Drainage. It also advises the Project Implementation Division on all technical aspects.

16.5 *Farm Machinery Section*

The number of vehicles and equipment and their maintenance and repairs were as follows:—

ITEM	*No. at 31.12.79*	*Addition during 1980*	*Deletion during 1980*	*Existing on 31.12.80*	*Servicing and Repairs*
Lorry	18	NIL	NIL	18	377
Van	20	4	3	21	802
Land Rover ...	14	NIL	2	12	329
Car	14	NIL	4	10	238
Two wheel Tractor	3	12	NIL	15	4
Tractor ...	35	1	4	32	199
Lawn Mower ...	91	2	2	91	337
Trailer	50	13	14	49	77
Sprayer motorised ...	80	11	NIL	91	64
Sprayer hand ...	134	8	NIL	142	
Workshop tools and equipment ...	49	NIL	NIL	49	15
Engines and pumps	25	NIL	1	24	23
Compressor ...	4	1	NIL	5	7
Concrete Mixer ...	4	NIL	NIL	4	1
Dumper ...	2	NIL	NIL	2	3
Farm equipment ...	27	NIL	NIL	27	28
Implements ...	41	1	NIL	48	10
Generator ...	2	NIL	NIL	2	1

The following works were also carried out:—

(i) 200 ft o fsteel angle purlins manufactured and 4228 ft installed at Palmar Livestock Breeding Station.

(ii) Manufacture of one bean thresher.

(iii) Installation of a water-pump for washing feedlots at Richelieu.

(iv) Erection of a potting shed (steel tubular structure) at Abercombie Nursery.

(v) Manufacture of 3 trailer bodies.

(vi) Manufacture and installation of 4 sluice gates at Terre Rouge Land Settlement.

(vii) Manufacture of hydrant pipes for Small Scale Irrigation System at Plaisance.

(viii) Installation of Jette-Bout attachment on Silk Beeling Machine at Curepipe Experiment Station.

(ix) Erection of silos and gain conveying system (95% completed) at Livestock Feed Factory.

(x) About 150 miscellaneous repair works and manufacture of bolts, stubs, nuts, flanges, brushes, tools etc.

16.6 *Farm Building Section*

The following were prepared:—

(i) Architectural and structural drawings for an Engine Room at Reduit.

(ii) Drawings for R.C. Manholes and Inlet Hoppers.

The Silkworm Rearing Buildings were handed over in October .

Work started on the construction of Block No. 2 (Seed Processing Building) at Barkly Experiment Station.

Maintenance work was carried out on the Quarantine Greenhouses at Reduit.

Technical supervision of construction and repair works was carried out by the staff of the Division on experiment stations.

16.7 *Irrigation soil Conservation and drainage Section*

The following designs were prepared:

(i) Overhead irrigation system for kitchen garden at Government House.

(ii) Drip Irrigation System for Letchi orchard at Richelieu.

(iii) Overhead Irrigation System at Pte. aux Sables Cane Nursery.

An experiment was conducted regarding the relation between discharge and pressure head in drippers and friction losses in microtubes.

The results are as follows:—

(a) Discharge through 7.5 cm of microtube ending in a 12mm p.v.c. dripper filled with cement bonded aggregate:—

$Q = 0.22\ H^{0.69}$ for microtube 1 mm diam.

$Q = 0.98\ H^{0.60}$ for microtube, 1.5 mm diam.

Q expressed in litres/hr

and H in cm.

(b) Friction losses in 1.0 mm microtube.

$J\% = 83.25\ Q^{1.10}$

Friction losses in 1.5mm microtube

$J\% = 15.58\ Q^{1.87}$

Q expressed in litres/hr

and $J\%$ in pressure head loss/100 units of length of microtube.

The above results were used in the design o fthe drip irrigation system for the Letchi orchard at Richelieu Experiment Station.

16.8 *Other Activities*

Staff of the Division particpated in the preparation of projects for (i) establishment of two seed production units at Pte. aux Sables and La Ferme and

(ii) production of biogas from livestock slurry at Richelieu Livestock Breeding Centre.

The Principal Agricultural Engineer represented the Ministry on the National Road Safety Committee. This Committee advises Government on measures to improve road safety in the island.

16.9 The Principal Agricultural Engineer followed a course on organisation and Management of Agro-Industrial Enterprises in Novi Sad, Yugoslavia in May and June and Agricultural Engineer S. Purmanund followed a course on maintenance of vehicles in Brussels, Belgium in November and December. The two courses were organised by UNIDO.

XVII. Land use and Environment and Projects Division

HEAD OF DIVISION: S. P. MAUREE, DIVISIONAL SCIENTIFIC OFFICER UP TO 18.8.80; M. RAMTOHUL, ACTING DIVISIONAL SCIENTIFIC OFFICER FROM 19.8.80

17.1 The Land Use, Environment and Projects Division is responsible for:—

(i) Land Use and Soil Conservation;

(ii) Land Settlements;

(iii) Planning and Monitoring of Projects;

(iv) Matters relating to the Environment.

17.2 *Land Use*

The main objective of the Division is to try to optimise the use of the very limited resources of Mauritius. Several cases of intended use of lands for non-agricultural purposes were referred to the Division for advice and recommendations; these were attended to while considering the safeguard of good agricultural land.

17.3 *Land Settlements*

17.3.1 A total of about 1225 Arpents of Crown Land is under the control of this Division and is leased to 657 tenants grouped in 14 Land Settlements. They are situated at Terre Rouge, Vale, La Cave, Petit Sable, Grand Sable, Pointe aux Feuilles, Palmar, Plaisance, Papavert, Bee Manique, Richelieu, Moona, Elysee and Belle Vue.

17.3.1.1 *Terre Rouge Land Settlement*

Acreage	...	282 arpents
Soil type	...	Low Humic Latosols
No. of tenants	...	113
Crops	...	Sugar cane and Food crops

This land settlement is provided with irrigation water, except for 15 arpents which are non irrigated. During the year, repairs and maintenance works were effected on irrigation canal.

17.3.1.2 *Vale Land Settlement*

Acreage	...	15 arpents
Soil type	...	Regosols
No. of tenants	...	13
Crops	...	Sugar cane and Foodcrops

17.3.1.3 *La Cave Land Settlement*

Acreage	...	4 arpents
Soil type	...	Latosolic Reddish Prairie
No. of tenants	...	3
Crop	....	Sugar cane

17.3.1.4 *Petit Sable Land Settlement*

Acreage	...	72 arpents
Soil type	...	Mountain slope complexes
No. of tenants	...	51
Crops	...	Sugar cane of onions

17.3.1.5 *Grand Sable Land Settlement*

Acreage	...	46 arpents
Soil type	...	Mountain slope complexes
No. of tenants	...	44
Crops	...	Sugar cane and onion

During the year, two tenants persisted in consisting concrete buildings on their holdings, despite the fact that permission had not been granted to them. Disciplinary action is being contemplated against them.

17.3.1.6 *Pointe aux Feuilles Land Settlement*

Acreage	...	2 arpents
Soil type	...	Mountain Slope Complexes
No. of tenants	...	8
Crop	...	Sugar cane

17.3.1.7 *Palmar Land Settlement*

Acreage	...	363 arpents
Soil type	...	Latosolic reddish prairie and regosols
No. of tenants	...	116
Crops	...	Sugar cane and onion

During the year ex-sand quarry was levelled. Consequently, all plots of the sandy areas were resurveyed and boundaries were fixed.

17.3.1.8 *Plaisance Land Settlement*

Acreage	...	132 arpents
Soil type	...	Latosolic Reddish Prairie
No. of tenants	...	127
Crop	...	Foodcrops

The irrigation net work which started under the Small Scale Irrigation Projects, was nearing completion. All tenants had grouped themselves in a Water Users' Co-operative Society for the efficient running of this project.

The Airport Authority complained that the tenants had piled up stones against the Airport perimeter fence. All tenants, adjacent to Airport Perimeter Fence, were urged to remove the stones from the fence.

17.3.1.9 *Papavert Land Settlement*

Acreage	...	26 arpents
Soil type	...	Latosolic Reddish Prairie
No. of tenants	...	31
Crop	...	Foodcrops

17.3.1.10 *BeeManique Land Settlement*

Acreage	...	160 arpents
Soil type	...	Humic Ferruginous Latosols
No. of tenants	...	80
Crops	...	Sugar cane, and Cardamon (2 arpents)

17.3.1.11 *Richelieu Land Settlement*

Acreage	...	60 arpents (with irrigation water)
Soil type	...	Low Humic Latosols
No. of tenants	...	19
Crops	...	Sugar cane and Foodcrops

17.3.1.12 *Moona Land Settlement*

Acreage	...	14 arpents
Soil type	...	Latosolic Reddish Prairie/Low Humic Latosols complex
No. of tenants	...	6
Crop	...	Foodcrops

17.3.1.13 *Elysee Land Settlement*

Acreage	...	39 arpents
Soil type	...	Latosolic Forest
No. of tenants	...	38
Crop	...	Chouchou mainly

17.3.1.14 *Belle Vue Land Settlement*

Acreage	...	10 arpents
Soil type	...	Humic Latosols/Mountain slope complexes
No. of tenants	....	8
Crop	...	Sugar cane

17.3.2 The Land Settlements were visited regularly. Cases of non-compliance with the conditions of the lease and disputes over boundaries were attended to.

17.3.3 The plantations on the Land Settlements were affected by cyclones Hyacinthe and Jacinthe and by flood conditions.

17.3.4 The Land Settlement Committee met in December 1980. The Committee approved 28 cases of transfer.

17.3.5 The process of renewal of lease progressed satisfactorily. A total of 363 leases were renewed out of 657.

17.3.6 A list of 208 tenants who were in arrears for more than Rs 100 up to 30.6.80 was submitted to the Principal Crown Attorney's Office for prosecution. Monthly returns of payment effected at the Principal Crown Attorney's Office were submitted to this Division.

17.3.7 Revenue collected from Land Settlements for the year 1980 amounted to Rs 160,175.

17.3.8 This Division undertook, on behalf of the Ministry of Lands, Town and Country Planning, to find out a suitable tenant for a portion of land of area 1A 50P at Trou Maho, Quatre Cocos. Applications were invited through notices posted in the nearby localities. 66 applicants were received and interviewed.

17.3.9 During the year, this Division received some 60 applications for lease of crown land. All cases were examined and reports were submitted accordingly.

17.4 *Projects*

17.4.1 *(a) Northern Plains Irrigation Pilot Project*

17.4.1.1 At the beginning of the year, the Division was involved in compiling the lists of assets of the Northern Plains Irrigation Pilot Project and the Small Scale Irrigation Project.

17.4.2 *(b)* During the second half of the year, the Division was mainly involved in the monitoring of different projects of the Ministry. Four project proposals for European Development Fund Assistance under Lome II Convention were submitted to the Division for detailed study. Officers of other Divisions and the Economist of the Ministry collaborated in all phases for the presentation of these projects.

17.4.2.1 The project titles are as follows:

1. Diversification of the Pointe aux Sables Sugar Cane Nursery and the La Ferme Co-operative Farm Training Centre into a Vegetable and Tobacco Seed Production Centre.
2. Improvement to the production and quality of flue-cured tobacco.
3. Improvement of Coconut Production on the islands of Agalega, Rodrigues and Mauritius.
4. Rice Project in the Western Coast.

17.4.2.2 The preparation of the first project has been completed and a report thereon submitted to the EDF. As regards the second project, a preliminary study was carried out to estimate the cost of production of tobacco seedlings in soil blocks and a report thereon has been submitted to the Tobacco Board. The two other projects are still under study.

17.4.2.3 Another project on Propagation of Anthurium through Meristem Culture has been prepared and submitted to the UNDP.

17.4.3 *Small Scale Irrigation Project*

17.4.3.1 This project aims at providing irrigation water to planters, whose lands are not covered by the two main irrigation projects (Northern Plains Irrigation Project and Western Coastal Region Irrigation Project).

17.4.32. Under the French Technical Assistance Scheme, the services of Mr. Jean Amelot, Irrigation Engineer, were again made available for the implementation of the Small Scale Irrigation Project.

17.4.3.3 Furthermore. all the projects considered for implementation last year, were financed by the French Government.

17.4.3.4 *Plaisance Irrigation Scheme*

Under this scheme, irrigation water will be provided to the Plaisance Land Settlement, Experimentation Station and the Demonstration Centre This project is nearing completion. All physical works have been completed, and it is expected to be operational soon.

17.4.3.5 *L'Espérance Trebuchet Irrigation Scheme*

A study for the implementation of Drip Irrigation over an area of 230 arpents, belonging to some 150 small planters, has been prepared by Mr. Jean Amelot. But the implementation of this project has been withheld due to poor response from planters and the decrease in the area, earmarked for irrigation.

17.4.3.6 *Trois Ilots Irrigation Scheme*

This porject covers an area of 153 arpents, belonging to small planters. A study for the implementation of the project has been prepared by Mr. Jean Amelot. A Water Users' Co-operative Society has already been established, but the main constraint is about water rights.

17.4.3.7 *Balaclava Rice Project*

The implementation of this project is still under consideration. The major constraint is the purchase of land which is owned privately.

17.4.3.8 *Identification of New Irrigation Projects*

An additional irrigation scheme has been identified at Palmar/Trou d'Eau Douce region. Contacts made with farmers, showed that the irrigation scheme was welcome. Mr. Jean Amelot has already prepared a study for the implementation of this project. He has also made negotiations with Constance Sugar Estate to buy a borehole with an output of 600 gpm. together with pumps and accessories, under the French Assistance Scheme. The water will suffice to irrigate the whole of Palmar/Trou d'Eau Douce area.

17.4.4 *Boreholes on Small Planters' Fields*

17.4.4.1 Left-over claims for the drilling of individual boreholes on ten planters' fields were issued at the beginning of the year. The planters were contacted regularly, and one planter responded immediately and paid the amount due. Three planters have made part-payments, and five of them have promised to start payment soon. One planter has requested that the claim be waived off.

17.5 *Survey Section*

17.5.1 The Survey Section of the Ministry was mainly involved in the delimitation of the boundaries of Land Settlements and their sub-divided plots, and in the preparation of new plans, so as to facilitate the renewal of leases.

17.5.2 Likewise, as during previous years, regularisation of tenancy by squatters was dealt with. Encroachement on lands by tenants continued to be a source of worry and the surveying team has been busy in remeasuring and regularising litigious cases in the following land settlement sites: Grand Sable, Petit Sable, Bee Manique, Plaisance, Papavert, Terre Rouge and the Buffer Zone at Cap Malheureux.

17.5.3 The Survey Section also assisted the other Divisions of the Ministry in preparing plans and demarcation of lands for project sites as and when required.

17.6 *Land Suitability Evaluation*—D. Domun (Scientific Officer)

17.6.1 *(a)* Site investigations, in connection with applications for the lease of crown lands, were effected at the following places to assess their land suitability: Bee Manique, Palmar, Le Chaland, Poste de Flacq, Palma, Richelieu, Mon Bois and Crown Land Perrier and de Rauville.

17.6.1.2 *(b)* The costs of production and net returns per arpent of onion cultivation at crown land Palmar and banana cultivation at crown land Bee Manique were worked out to determine the plot size to be leased to applicants in the future.

17.6.1.3 *(c)* The possibility of converting 100 arpents of agricultural land at Orixa into a residential zone after the cultivation of sugarcane by Medine Sugar Estate on 100 arpents of follow lands at Medine was studied by the Division. This necessitated an investigation of these lands on the following aspects: Land form, soil type, period of moisture deficit, present land use, land suitability, major land improvements needed and distance to Medine Sugar Factory.

17.6.1.4 *(d)* In connection with agricultural projects, the following centres were visited to investigate on soil type, climate, period of moisture deficit, land suitability and major land improvements to be effected:

(i) Pointe aux Sables Sugarcane Nursery for diversification into a vegetable and tobacco seed production centre.

(ii) La Ferme Agricultural Cooperative Centre for vegetable seed production.

(iii) Agricultural Cooperative Centres at Pointe aux Piments and Arsenal for the production of tobacco seedlings.

(iv) Palmar Livestock Breeding Station for the intensification of fodder production.

17.6.1.5 *(e)* The following information regarding the land units suitable for paddy rice cultivation according to the Land Suitability Map of Mauritius (FAO and MSIRI, 1973) have been compiled and presented in Tables 17.1 and 17.2 below: gross area, geographical location, landform, altitude climate, soils, present use, actual suitability, and major improvements needed. The regions comprising these land units have been identified and their land ownership is shown in Table 17.3.

TABLE 17.1

GEOGRAPHICAL LOCATION, CLIMATE AND SOILS OF LAND UNITS SUITABLE FOR PADDY RICE CULTIVATION

Land Unit and Gross Area	*Geographical Location*	*Landform and Altitude Range*	*Climate*	*Soils*
2.4 (2,205ha)	Low lying lands in W. Northern plain and Western Coastal Region	Flat or almost flat; slopes mostly 2% Alt: 0–180m mostly 90m	P=900–1400mm. E_o=1750–1950mm.	Grey Hydromorphic Soil (Balaclava family); deep to mod. deep, grey plastic clay over mottled Bhonzon few to frequent stones and boulders. Imperfectly drained.
3.5 (445ha)	Mare d'Australia basin and similar wet Lands	Flat or almost flat with concave relief Alt: 60–230m	P=1900–3200mm. E_o=1550–1700mm.	Grey Hydromorphic Soil (Balaclava family); mod. deep to deep ,greyish plastic clay on mottled subsoil; stony in parts. Imperfectly to poorly drained.
4.1 (2,915ha)	Western Valley flats and South Western Coastal plains	Flat or almost flat to gently undulating; slopes mostly 5% Alt: 0–105m	P=900–1500mm. E_o=1700–1900mm.	Dark magnesium Clays; deep, sulfmulching black or dark grey, heavy montmorillonitic clays on alluvium or colluvium; few to frequent gravels and stones of fairly fresh compact olivine basalt of older volcanic series, abundance increasing towards slopes. Imperfectly or poorly drained.

P = mean annual precipitation in millimetres

E_o = mean annual evapotranspiration (Penman) in millimetres

TABLE 17.2

PRESENT USE, LAND SUITABILITY AND MAJOR IMPROVEMENTS NEEDED

Land Unit	*Present use*	*Actual suitability*	*Potential suitability*	*Major improvements needed*
2.4 ...	Sugarcane, rice, vegetables with extensive areas in scrub or grass; some forest plantations	(S2): Productive forestry, Livestock grazing/fodder S3 : Sugarcane, Mixed Cropping	S1 : Paddy Rice Limited Mixed Cropping S2 : Sugarcane (S2): Foodcrops Forestry, Livestock grazing/fodder	1. Irrigation 2. Derocking in certain parts of the land unit
3.5 ...	Rice, vegetables and sugarcane; rougher areas are scrub forest	S1 : Paddy Rice (S1): Mixed Cropping S3 : Sugarcane	S1 : Paddy Rice (S1): Mixed Cropping S3 : Sugarcane	None
4.1 ...	Sugarcane, vegetables, rice, orchards and scrubforest with grass	S2 : Productive Forestry and/or Livestock Fodder or Grazing	S1 : Paddy Rice Limited Mixed Cropping. Limited Foodcrops S2 : Sugarcane; Production Forestry and/or Livestock Fodder or Grazing	Irrigation

S1 = Highly suitable
S2 = Moderately suitable
S3 = Marginally suitable

(S1) = Highly suitable only partly within the land unit.
(S2) = Moderately suitable only partly within the land unit.

TABLE 17.3

REGIONS COMPRISING LAND UNITS SUITABLE FOR PADDY RICE CULTIVATION AND THEIR LAND OWNERSHIP

Land Unit	*Regions*	*Land Ownership*
2.4 ...	Albion region and Petite Rivière	Planters > 100 arp. of land
	Mon Vallon, Anna, Balaclava, Arsenal, Cascavelle, Cressonville (Beau Songes) Mon Desir, Poudre d'Or, Schoenfeld and Wolmar	Sugar Estates
	La Chaumière, Médine and Moulin a Poudre	Planters < 100 arp. of land + S.E.
3.5 ...	Mare d'Australia, Pascal and Salazie	Planters < 100 arp. of land
	Hermitage	Planters > 100 arp. of land
	Camp Ithier, Camp de masque, Mare Choisy, Providence and Queen Victoria	Sugar Estates
	La Gaieté and Mare Goyaves	S.E. + planters < 100 arp. of land
4.1 ...	Vallée des pretres	Crowland + Planters < 100 arp.
	Cotteau Raffin, Morne Brabant, Grande Rivière Noire and Tamarin region	Planters > 100 arp. of land
	La Gaulette, Grande Case Noyale, Magenta and Petite Rivière Noire, Guibies	Sugar Estates

17.6.2 *Soil Erosion Survey*

17.6.2.1 The regions, comprising the 12 erosion susceptible units of the island, have been identified. Nine of these land units have been surveyed; the remaining three will soon be investigated and recommendations for soil conservation measures proposed.

17.7 *Environment* — T. S. Ramyead (Scientific Officer)

17.7.1 In accordance with its objectives on environmental matters, the environment section of the Division dealt with the following aspects during the year:

(i) Investigation of pollution complaints.

(ii) Advice to the Ministry on the environmental aspects involved in proposed projects.

(iii) Survey of Environmental pollution problems:

(a) on sugar estates

(b) at the Plaine Lauzun Industrial Zone and St. Louis River

(iv) Compilation of existing environmental legislation.

(v) Preparation of programmes for 'World Environment Day'.

17.7.1.1 *Investigation of pollution complaints*

Environmental pollution problems were investigated, following requests from the Ministry; sometimes members of the public lodged their complaints by writing directly to the Division. The complaints received during the year fell mainly in the following categories:

(a) Air pollution caused by chimney smoke (containing flyash) from sugar factories.

(b) The pollution of waterways by industries, including sugar factories.

(c) One or two isolated cases of indiscriminate refuse dumping.

The above investigations sometimes involved the close collaboration of other Ministries and bodies concerned. Reports and recommendations following the investigations, were submitted to the Ministry which wrote to the parties concerned, requesting them to take action accordingly.

In many pollution-complaint cases, it was necessary to effect several on-site visits to ensure that the appropriate remedial measures were being taken.

17.7.1.2 *Advice to the Ministry on proposed projects*

The division also advised on the environmental aspects of projects proposed by members of the public.

17.7.1.3 *Survey of environmental pollution problems on sugar estates*

Over the past few years, inhabitants, residing in the vicinity of various sugar factories, have lodged numerous complaints regarding pollution to the Ministry, the press and at Legislative Assembly level. The Division carried out a survey on a selected number of sugar factories so as to compile information on the problems being faced by both the inhabitants and the sugar factories. Amongst others, interviews were held with the managers of the following factories: Savannah, Riche-en Eau, Constance-La Gaieté, Highlands and Société Reufac (Reunion).

The air pollution complaints were due to the emission of flyash from the main chimney stacks of these factories. The fly-ash ('hydro-carbure') settled over residential areas within a radius of about two to three miles (depending on topography and prevailing winds) causing nuisance such as the soiling of buildings and of clothes on outside clothes-lines.

Most sugar factories in Mauritius are situated close to waterways, for obvious water requirement reasons, and the pollution of these waterways by effluents from the factories is to some extent, inevitable. One common effluent polluting the waterways was the water from the wet-scrubbers which several factories have incorporated in their chimney stacks, so as to minimize the amount of fly-ash, escaping in the exhaust gases from the main boilers. The effluent from the wet-scrubbers contained a certain percentage of fly-ash, and these were frequently discharged into nearby waterways, causing harm to aquatic life and creating inconvenience to the washing of clothes by riverains.

One or two cases of thermal pollution (i.e. the pollution of these waterways by the discharge of hot effluents from the factories) were also observed.

It must be noted that aforementioned pollution problems have existed on sugar estates for a long time, but the present strong and frequent complaints of the inhabitants may be attributed to the following factors (amongst others):

(i) Increased population on and around sugar estates.

(ii) Environmental awareness brought about by local governmental and non-governmental organisations, and by the United Nations Environment Programme (UNEP).

(iii) The special attention being given by these organisations towards the investigations and remedial measures to help minimize the pollution problems.

However, the survey also revealed that the management of quite a few sugar factories was reasonably pollution conscious and had so far devised (or attempted to devise various systems so as to abate atmospheric and river water pollution. The efficiency of these systems varied from poor to satisfactory, but it would seem that the efforts and experiments carried out by sugar factories (to abate pollution) were so far isolated, and that there could have been an organised and concerted information exchange among the factories, on the subject of pollution, particularly the pollution problems in question.

Survey of River St. Louis and Plaine Lauzun Industrial Zone

An increasing number of rivers and canals in Mauritius are being subject to pollution by industrial and other activities. St. Louis River (which runs more or less parallel to Grand River North West) and its surrounding environment represent a typical situation of industrial pollution, and the Division carried out a fairly comprehensive survey of this case.

This survey comprised the following essential activities:

(i) The launching of about 50 questionnaires to industries bordering St. Louis River. The questionnaires requested information on raw materials used, the nature and volume of effluents discharged and the lieu of disposal of these effluents. About 50% of the industries replied, providing fairly useful information.

(ii) Several formal and informal interviews were held with riverains and industrialists during site investigations.

(iii) BOD (5-day, 20°C) tests were carried out on water samples taken at different points along the river.

(iv) The various drains and canals discharging into the river were surveyed.

(v) Most of the present existing legislation governing the pollution of waterways, was consulted.

17.7.1.4 *Compilation of existing environmental legislation*

So far, environmental legislation from the following sources have been complied:

(i) Legislation from the 'Consolidated Version of the Statutes', volumes I to VII, published by the Attorney General's Office in 1972.

(ii) The relevant Government Notices (G.N.'s) related to the above legislation, and Notices appearing continually in the Government Gazette have been noted.

(iii) Note has also been taken of Amendments and Bills (relevant to environmental matters) which have been passed during the year.

The above legislation has been complied with the following objectives:

(a) To provide a ready reference when dealing with cases of pollution complaints and writing the reports and recommendations thereof.

(b) To advise the Ministry on the up-dating and establishment of legislation.

17.7.1.5 *World Environment Day*

World Environment Day is organised by the United Nations Environment Programme (UNEP) and is observed on the 5th of June every year by many countries throughout the world. The themes for World Environment Day, 1980, were as follows;

(a) Climatic changes, deforestation, carbon dioxide and the carbon cycle.

(b) Environmental health: Heavy metal hazards.

(c) Transport and the environment.

(d) The environmental effects of military activity.

(e) The child and the environment.

The Division organised a telecast forum on the above topics, with the participation of representatives of the Ministry of Agriculture and Natural Resources and the Environment, Ministry of Health, Ministry of Social Security and Meteorological Services.

The Minister of Agriculture and Natural Resources and the Environment delivered a talk on telivision, on the above themes.

The Division also forwarded various notes and explanations on these themes to all the members of the Man & the Biosphere Advisory Committee, requesting the latter to display the information o nthe notice boards of their respective organisations.

17.7.2 *Infoterra*

17.7.2.1 INFOTERRA was set up by the United Nations Environment Programme (UNEP) and has been operational since 1977. It is a world-wide system which enables its 100 member-countries or so, to exchange environmental information. The Division, which is the National Focal Point (NFP) for INFOTERRA in Mauritius, continued its activities in this field. The following are some requests for information which were handled at the NFP:—

(a) Biogas technology: substantive information was obtained on this subject, from the INFOTERRA headquarters in Nairobi, for another Division of the Ministry.

(b) Environmental Impact Statement: The Division obtained useful literature on the preparation of Impact Statements from the INFOTERRA NFP in Thailand.

(c) Environmental legislation in Mauritius: Information on this matter was forwarded to the NFP in India.

(d) Solar radiation measurements and solar energy research in Mauritius; The relevant information was forwarded to the University of Alabama, in the United States.

17.7.3 *Projects*

17.7.3.1 The Division prepared the following projects with a view to seek funds from international organisations for their implementation:

(i) *Biogas Generation from feedlot effluents*

The objectives of this project were to meet part of the power requirements of Richelieu Experiment Station and to proceed with further experiments so as to improve the yield and application of biogas on the station. The use of the digested liquid slurry as fertiliser for crops was also incorporated in the project.

(ii) *Monitoring of water pollution, caused by industrial activities*

This project had as objective, the assessment and continual monitoring of the present state of waterways, especially, those which were constantly subject to industrial pollution, so that environmental legislation in this sphere could be up-dated and improved.

17.7.3.2 This project has been approved by, and included in the Register of the UNESCO for Research and Development. It will be implemented as soon as funds are available from UNESCO.

17.8 *Research* — M. Ramtohul (Acting Divisional Scientific Officer)

Onion (Allium cepa L)

17.8.1 *Onion variety and planting date trial*

A variety and planting date trial on onion was planted at Richelieu Experiment Station to study the effects of planting dates and five varieties of onion on yield and keeping quality of bulbs. The design was a split plot with planting dates as the main treatments and four replicates in a randomized completed block lay-out. The treatments were as follows:—

A. *Planting dates*

1. Seeds sown on 26th March 1980
2. Seeds sown on 11th April 1980
3. Seeds sown on 26th April 1980
4. Seeds sown on 26th May 1980

B. *Varieties*

1. Pyramid
2. Bon Accord
3. Hojem
4. Pretoria Grano
5. Local Red

17.8.1.2 Fourty five days after the sowing of seeds, the seedlings were transplanted at a spacing of 15 cm × 10 cm into plots which received 10 tons of Manure/ha, 75 kg N/ha, 120 kg K_2O/ha and 60 kg P_2O_5/ha.

17.8.1.3 The bulbs were havested, when more than 75% of the tops had fallen over. They were then cured under cover and as soon as the roots and tops were completely dry, they were cut off and measurements made on the cleaned bulbs.

17.8.1.4 The mean yield of bulbs for each planting date and variety is presented in Table 17.4.

TABLE 17.4

YIELD OF BULBS (TONS/HA)

	Varieties					
Planting dates	*Pyramid*	*Bon Accord*	*Hojem*	*Pretoria Grano*	*Local Red*	*Mean*
P_1	53.04	37.11	58.35	43.37	14.06	41.19
P_2	39.62	32.88	63.59	29.04	11.15	35.26
P_3	32.46	32.21	30.96	28.97	10.65	27.35
P_4	14.95	15.76	19.83	17.62	9.08	15.45
C. Mean	35.02	29.49	43.19	27.75	11.61	

There was no significant difference in the yield of bulbs averaged over all varieties between planting dates P_1 and P_2. However, seeds sown late, i.e. on 26th April and 26th of May produced significantly lower yields of bulbs than early sowings.

17.8.1.5 There was no significant difference in the yield of bulbs between Bon Accord and Pretoria Grano. As in the trial carried out in the previous year, the variety Hojem produced the highest yield in the experiment followed by 'Pyramid'. The variety 'Local Red' produced the lowest yield of bulbs and this was significantly different from the mean yield of bulbs of other varieties.

17.8.2 *Onion observational trial*

A trial to study the effects of 4 planting dates and seven varieties of onion on bulb yield was planted at Richelieu Experiment Station. The design was split plot with planting dates as the main treatment and three replicates in a randomized complete block layout.

17.8.2.1 The treatments were as follows:

A. Planting dates

P_1 ... Seeds sown on the 26th of March

P_2 ... Seeds sown on the 11th of April

P_3 ... Seeds sown on the 26th of April

P_4 ... Seeds sown on the 26th of May

B. Varieties

V_1 ... Red Star

V_2 ... Red Granex

V_3 ... Henry's special

V_4 ... Dessex

V_5 ... Texas Grano 502

V_6 ... Red Creole

V^7 ... Tropicana hybrid

17.8.2.2 The seedlings were transplanted at a spacing of 15 cms × 10 cms. Prior to transplanting, all plots received fertilizers at the rate of 150 kg N, 120 kg K_2O, 60 kg P_2O_5 and 20 tons of manure per hectare.

17.8.2.3 The bulbs were harvested when more than 75% of the tops had fallen over. The plants were allowed to dry under cover for a period of two weeks and the tops and roots were removed prior to measurement of yield.

17.8.2.4 The data on yield of bulbs for planting dates and varieties are summarized in Table 17.5.

TABLE 17.5

YIELD OF BULBS TONS/HA

Planting dates	V_1	V_2	V_3	V_4	V_5	V_6	V_7	*Planting date Méan*
P_1 ...	61.31	65.31	72.64	77.30	39.98	22.52	47.31	55.20
P_2 ...	41.31	65.04	41.98	58.64	39.98	29.85	43.31	45.73
P ...	38.65	42.11	49.98	29.98	35.31	21.19	35.98	36.17
P_4 ...	28.52	25.78	33.32	32.52	21.85	8.92	18.52	24.24
Mean ...	42.45	49.61	49.48	49.65	34.28	20.65	36.28	

Analysis of yield data showed the planting date and variety treatments to be highly significant, whereas the interaction between varieties and planting dates was not significant.

17.8.2.5 *Planting date treatments*

The planting date P_1 produced the highest yield of bulbs. Thereafter, a delay in sowing of seeds resulted in significantly lower yields of bulbs.

17.8.2.6 *Variety treatments*

TABLE 17.6

YIELD OF BULBS TONS/HA

Varieties	*Mean yield of bulbs*
V_1 Red Star ...	42.45 ab
V_2 Red Granex ...	49.61 a
V_3 Henry's special ...	49.48 a
V_4 Dessex	49.65 a
V_5 Texas Grano 502 ...	34.28 b
V_6 Red Creole ...	20.65 c
V_7 Tropicana F_1 ...	36.28 b

Means in the column followed by the same letter are not significantly different at 5% level of probability.

There was no significant difference in the yield of bulbs between varieties Red Star, Red Granex, Henry's Special and Dessex. 'Red Creole' produced the lowest yield of bulbs among varieties. There was no significant diffirence in the yield of bulb among Red Star, Dessex and Tropicana hybrid.

17.8.2.7 *Maturity and crop cycle*

The number of days after the sowing of seeds to reach above 75% maturity for each variety were determined. The data have been summarized in Table 17.7.

TABLE 17.7

CROP CYCLE (DAYS) FOR EACH VARIETY AND PLANTING DATE

Planting Date	*Red Star*	*Red Granex*	*Henry's special*	*Dessex*	*Texas Grano 502*	*Red Creole*	*Tropicana (hybrid)*
P_1 26th March ...	180	190	180	180	195	210	200
P_2 11th April ...	165	180	165	165	180	210	200
P_3 26th April ...	160	180	160	160	180	200	180
P_4 26th May ...	150	150	150	150	165	150	150

The maturity results (Table 17.7.) indicate that the varieties Red Star, Henry's special and dessex are the earliest to mature, followed by Red Granex, Texas Grano 502, Tropicana F_1 and Red Creole. Red Creole has the longest crop cycle (210 days), followed by Tropicana F_1. Planting of seeds late in May (P_4) reduces the crop cycle for all the varieties at the expense of yield of bulbs.

17.8.2.8 The bulbs of all varieties have been kept in the cold room of the Agricultural Marketing Board for keeping quality studies.

17.8.3 *Onion storage trial*

Onion bulbs, harvested from planting dates trial carried out in 1979, were kept for keeping quality studies. Three hundred bulbs, each of the cultivars Hojem, Pretoria Grano, Bon Accord and Pyramid were kept in wooden crates under ambient storage conditions at Richelieu Experiment Station. The design was a completely randomized layout with three replicates. The trial started on the 29th of September, 1980. At regular intervals, the bulbs were separated into sprouted, rooted, decayed and sound bulbs. The decayed bulbs included rotten and unmarketable shrivelled bulbs. The results have been summarised in Table 17.8.

TABLE 17.8

CUMULATIVE MEAN % OF DECAYED BULBS AT DIFFERENT STORAGE PERIODS

Cultivar	*30 days of storage*	*60 days of storage*	*115 days of storage*	*145 days of storage*
Bon Accord	10.3 a	28.3 a	46.33 a	51.0 a
Pyramid	31.6 b	59.3 b	83.33 b	87.0 b
Hojem	31.3 b	47.0 c	60.33 c	66.3 c
Pretoria Grano ...	26.0 c	50.3 c	69.60 d	74.3 d

Means in the column followed by the same letter are not significantly different at 5% level of probability.

After 145 days of storage, the cultivar Bon Accord had the best keeping quality characteristic among the introduced cultivars from South Africa, followed by Hojem. Decay of bulbs, during storage, was due to soft rot, caused by *Erwinia* spp. The bacteria, causing soft rot could have infected the bulbs prior to harvest, and these develop rapidly at storage under ambient temperature. Loss in marketable quality of bulb due to sprouting was very low. After 145 days of storage, an average of 3% of bulbs had sprouted. There was no problem with rooting of bulbs, probably, because of the low humidity, prevailing in the store room.

17.8.3.2 It would be interesting to note that 'Hojem' has produced very high yields and this cultivar could become popular among farmers. It would be worthwhile to try storage at cold temperatures (2 - 5° C), so as to inhibit development of organisms, causing soft rot. 'Bon Accord' could also improve its keeping quality, if kept under cold storage conditions.

17.8.4 *Garlic (Allium sativum* L.)

17.8.4.1 *Variety trial*

A variety trial on garlic to assess the yield of bulbs of 'Pooning', 'Feng Shan Selection No. 1', 'Feng Shan Selection No. 2' and 'Rodrigues', was planted at Central Experiment Station on the 25th April 1980. The design was a randomized complete block lay out with four treatments and six replicates.

17.8.4.2 The cloves were planted at a spacing of 20 cm × 10 cm. Prior to planting, all plots received fertilizer at the rate of 60 kg K_20 and 60kg P_20_5 and 10 tons of manure per hectare. Nitrogen fertilizer at the rate of 100 kg N/ha was applied as a side dressing two weeks after germination.

17.8.4.3. The development of the plants was quite satisfactory. In the 2nd week of June, all varieties had produced an average of 7 leaves per plant. The emergence of new leaves continued at the rate of one leaf per plant per week, until maximum of 14 leaves per plant was obtained for all varieties.

17.8.4.4. Yield data (Table 17.9.) showed no significant difference between the treatments. However, there is an indication that the variety Rodrigues is more adapted to local agro-climatic conditions.

TABLE 17.9.

YIELD OF BULBS (TONS/HA)

Varieties	*Mean Yield*
Fengshan Selection No. 1 ...	... 10.59
Fengshan Selection No. 2 ...	... 10.07
Pooning	... 11.01
Rodrigues	... 11.91

17.8.5. *Garlic Planting date trial*

17.8.5.1. A trial on garlic to supply the effects of 5 planting dates on the yield of bulbs of varieties Pooning was planted at the Central Experiment Station. The design was a randomised complete block lay-out with five treatments and five replicates. The treatments were as follows:—

T_1—Planting date 25th March

T_2—Planting date 11th April

T_3—Planting date 28th April

T_4—Planting date 14th of May

T_5—Planting date 28th of May

Garlic cloves were graded such that each above weighed about 1.6 gm. These were then planted at a spacing of 20 cm × cm. Prior to planting, all plots received fertilizers at the rate of 60 kg K_2O, 60 kg P_2O_5 and 10 tons of manure per hectare.

17.8.5.2. The plants were tagged in the 2nd week of June to study the pattern of emergence of outermost leaves. The trend was similar among all planting date treatments indicating the emergence of one new leaf at weekly intervals until maturity. The data are summarised in Table 17.10.

TABLE 17.10

MEAN NUMBER OF LEAVES PER PLANT

Planting Date Treatment	*16th June*	*25th June*	*3rd July*	*17th July*	*30th July*	*7th August*
T_1 25th March ...	11	12	14	15	15	15
T_2 11th April ...	9	10	12	14	15	15
T_3 28th April ...	8	9	10	13	15	15
T_4 14th May ...	5	6	9	11	12	12
T_5 28th May	4	4	6	8	10	10

The plants from the first three planting dates produced a maximum of 15 leaves per plant around the end of July. Planting late in May affected vegetative development as only 10-12 leaves were produced by each plant.

17.8.5.3 Data on yield of bulbs harvested for planting date treatment are summarised in Table 17.11.

TABLE 17.11

YIELD OF GARLIC BULBS HARVESTED FROM DIFFERENT PLANTING DATE TREATMENTS

Planting daie	*Mean Yield of bulbs (tons/ha)*
25th March ...	12.55
11th March ...	11.92
28th April ...	11.83
14th May ...	9.92
28th May ...	9.75

There was no significant difference in the yield of bulbs between the planting date treatments. However, early plantings in March resulted in the highest yield of bulbs.

17.8.6 *Plant Introduction*

17.8.6.1 *Leafless Pea (Pisum sativum* L*)*

A sample of pea seeds was received in 1979. After fungicide treatment at the Plant Pathology Division, the seeds were planted on the 4th July, 1980, at Central Experiment Station for observation. The plant spacing was 50cm × 50 cm and five rows of 14 plants were obtained. The plants developed tendrils instead of leaves—hence the name leafless pea. The pods were allowed to mature and dry on the plant so as to collect seeds for further trials. Each plant produced an average of 11 pods.

17.8.6.2 The leafless pea could become successful among small planters, as they are less prone to foliar diseases such as powdery mildew and to leaf miners. Moreover, they are dwarf and tender pods could be picked at about fourty five days from the date of sowing of seeds. The seeds would have to be multiplied in the following season before proper trials on spacing and planting dates could be initiated.

17.9 *Miscellaneous*

17.9.1 *Study tour*

17.9.1.1 The Divisional Scientific Officer was sponsored by UNDP/FAO to visit the Asparagus Pilot Project in Lesotho from the 17th to 22nd November 1980.

17.9.1.2 Scientific Officer Ramyead attended a Biogas study-tour in China, which was organised jointly by UNIDO and the People's Republic of China. The tour dealt with large and small scale biogas technology and comprised site-visits to various biogas generating stations throughout the Republic.

17.9.2 *Staff Movements*

17.9.2.1 Technical Officer Mr. K. C. S. Kong Thoo Lin joined the Irrigation Authority as from January 1980. He has been replaced by Senior Technical Officer Mr. R. Mohabeer. Agricultural Superintendent Mr. B. Nundloll was temporarily in charge of the Field Services Division for a period of three months as from the beginning of this year, in replacement of Agricultural Superintendent Mr. S. Fakim. Technical Officer Mr. D. Bundhoo joined the Division at the beginning of September. Field Assistant Mr. R. Seeruttun joined the Irrigation Authority as from October this year.

17.9.3 *Boards and Committees*

17.9.3.1 The Divisional Scientific Officer sat on the following Boards and Committees during the year:

(a) Town and Country Planning Board.

(b) Land Settlement Committee.

(c) Onion and Garlic Committee.

(d) Man and Biosphere Committee.

(e) Rural Development Agricultural Committee.

17.9.3.2 The Scientific Officer (Environment) continued to serve as Secretary to the Man and Biosphere Advisory Committee.

XVIII. Field Services Division

HEAD OF DIVISION: M. SOOLTANGOS, SENIOR AGRICULTURAL SUPERINTENDENT

18.1 The Field Services Division comprised the following sections:

1. Transport Section
2. Livestock Feed Factory
3. Animal Feed Promotion Scheme
4. Reduit ground, Buildings and Workshops
5. Labour Coordination
6. Government House, Port Louis
7. Trunk Road

18.2 *Transport Section*

The running fleet of Vehicles (composed of 97 units) comprised cars, vans, jeeps, lorries and tractors, supplied transport to the various divisions of this Ministry.

18.2.1 The Land Rovers and cars were mainly used for the conveyance of officers, specialists, advisers, field staff, organised group tours and the payment of wages and salaries to personnel employed on out-stations.

18.2.2 The Lorries and tractors were mainly concerned with transport and field operations.

18.3 *Livestock Feed Factory*

18.3.1 The production of feedstuff for several types of Livestock has been the main activity of the Livestock Feed Factory. The feed produced was partly used by the Government breeding Stations and partly sold to the public. Five new types of feed were produced on an experimental basis, namely, mineral mixture, dairy feedlot supplement, broiler starter, broiler finisher and goat feed.

The first four were supplied to the Government Livestock Breeding Stations, whereas the fifth one was prepared and sold to goat breeders.

18.3.2 The total quantity of feed produced was 4197.945 tons; a figure which is lower than the one of the previous year. The decrease is due mainly to a lower demand from cowkeepers, whilst the demand for other types of feed has been steadily increasing.

18.3.3 The various types of feed produced, their sale prices and sale value were as follows:—

Type of Feed	*Total Production (Tons)*	*Rate/ton Rs cs*	*Total Sale Value Rs cs*
Chick feed	192.140	(a) 1970. (b) 2650. (c) 2900.	522,729.00
Poultry feed ...	912.140	(a) 1950. (b) 2590. (c) 2800.	2,404,615.35
Greep feed	7.050	(a) 1945. (b) 2540. (c) 2800.	16,712.30
Pig grower	181.400	(a) 1790. (b) 2300. (c) 2500.	415,094.50
Pig starter	92.400	(a) 2235. (b) 2480. (c) 2650.	229,429.25
Cowfeed	2,472.085	(a) 1354. (b) 1800. (c) 1960.	4,549,374.51
Bull feed	101.100	(a) 1700. (b) 2275. (c) 2450.	224,528.75
Calf feed	35.150	(a) 1970. (b) 2200. (c) 2350.	77,491.00
Rabbit feed	7.045	(a) 1723. (b) 2100. (c) 2400.	15,302.63
Special Horse feed ...	187.430	(a) 2100. (b) 2600. (c) 3000.	509,899.00
Broiler Starter ...	1.120	2950.	3,333.50
Broiler Finisher ...	.100	2850.	285.00
Goat feed	1.000	(a) 1290.25 (b) 1950.	2,115.60
Dairy feedlot Supplement	3.060	2634.82	8,062.55
Mineral Mixture ...	4.085	2090.	6,928.35
Total	4,197.945		8,985,901.29

(a) price up to the 27th February 1980

(b) price from the 28th February 1980

(c) price from the 1st July 1980

The price of raw materials had been rising considerably during the year and the sale price of the feeds had to be revised accordingly.

18.4 *Livestock Feed Promotion Scheme*

Sale of cowfeed under the cowfeed subsidy scheme was effected at 28 sale centres, spread across the country. About 2973 breeders registered themselves for the scheme, but only 1244 breeders had been purchasing their monthly quota of feed.

A total of 495,730 kgs of cowfeed were sold during the year. The subsidised sale price of Rs 0.84 cs per kg of cowfeed was maintained up to the 27th February 1980 and was subsequently revised twice during the year as follows: — Re 1.28 per kg up to the 30th June 1980 and Re 1.34 per kg as from the 1st July 1980. The increase in price were due to the rise in the cost of raw materials.

18.4.1 Other feeds sold at the feed centres at non-subsidised price were: —

Poultry feed	350,860
Chick feed	66,360
Pig grower	13,750
Pig starter	1,350
Rabbit feed	100
Goat feed	15

The demand for such feeds has more than doubled over the previous year.

18.5 *Reduit Grounds, Buildings and Workshops*

The grounds around the Head Office, Division of Veterinary Services and Poultry Centre were cared for and maintained throughout the year.

18.5.1 The Blacksmith, Carpentry and Motor Vehicle Workshops provided services to all Divisions of the Ministry for various jobs: maintenance and repairs to buildings, repairs to and supply of new items of furniture, repairs to agricultural equipment and minor maintenance and repairs to vehicles. The Motor Vehicle Workshop proved to be very useful as most of the vehicles are based in Reduit, and minor works which were carried out on the spot, helped towards eliminating additional travelling expenses and overtime which would have been incurred, if the works were done at the Richelieu Central Workshop.

The Binding section offered binding services to the different Divisions of the Ministry.

18.6 *Labour coordination*

Seasonal Labour was provided to the various divisions of the Ministry and a permanent labour force was maintained at the Plant Pathology Division for the Greenhouses.

18.7 *Government House, Port-Louis*

The grounds around the Government House and New Government Centre were cared for and maintained throughout the year.

18.8 *Trunk Road*

The central island and the verges of the Trunk Road were maintained throughout the year. Resurfacing of the motor ways caused damage to some of the flowering plants which will be revived in January/February 1981.

XIX. Agricultural Division—Rodrigues

OFFICER IN CHARGE: J. F. KWET ON, AGRICULTURAL SUPERINTENDENT UP TO THE 5TH DECEMBER

J. W. TOLBIZE, ACTING AGRICULTURAL SUPERINTENDENT AS FROM THE 6TH DECEMBER

19.1 *General*

No severe cyclones hit the island in 1980. Cyclone Kolia passed some 80 miles off the coast of the island on the 2nd March and did not cause much damage. Abundant and evenly distributed rainfall favoured the replenishment of dams and reservoirs, and a marked increase in crop and livestock production was observed.

The reconstruction of cyclone victims' houses continued till the end of October. The Agricultural Services had taken then excavated 103 house sites and built 194 houses, varying from 100 to 400 square feet floor space.

19.1.1 *Rainfall*

Stations	*1978* *mm*	*1979* *mm*	*1980* *mm*	*Normal for 10 years* *mm*
Plaine Corail ...	631.2	748.9	(1)1228.2	
Pointe Canon ...	759.8	1423.2	1587.7	1249
Solitude ...	1016.3	1885.9	(2)2211.1	2009
Lataniers ...	973.0	1505.1	1406.4	1492
La Ferme ...	1026.4	1670.5	(3)1267.1	1543
Oyster Bay ...	1099.4	2167.3	2339.4	1396
Rivière Coco ...	616.2	1748.5	—	1284
Port Sud Est ...	1078.7	1345.0	(4) 871.0	1071
Marechal ...	1087.9	1778.7	(5)1531.6	1326
Anse Ally ...	530.7	909.9	—	1157

Notes: (1) No data received for month of September
(2) No data received for month of January
(3) No data received for months of June and July
(4) No data received for months of July to December
(5) No data received for month of February

Nine inches of rain fell overnight on the 15th November and the consequences of such heavy downpours were quite surprising:

All dams were silted up.

Roads were badly damaged, crops washed away and the following losses in livestock were recorded.

108 cattle, 1,022 pigs, 439 goats, 2,123 sheep, 12,032 chicken and 164 turkeys died.

19.1.2 *Staff*

The Technical staff of the Agricultural Services was made up of one Agricultural Superintendent and one Senior Technical Officer at the beginning of the year.

19.1.3 Mr. G. Steve Mocudé, Technical Officer, arrived on the 3rd October on a tour of 18 months in Rodrigues.

19.1.4 Dr. B. Neerunjun, Veterinary Officer came on the 10th October on a tour of 12 months in the island.

19.1.5 Mr. J. F. Kwet-On Agricultural Superintendent left Rodrigues on the 6th December on a refresher course of 12 months.

19.1.6 The following Officers of the Ministry of Agriculture and Natural Resources and the Environment paid visits to the island:

(1) Mr. B. D. Roy, Chief Agricultural Officer, accompanied by Dr. S. Moutia, Principal Agricultural Officer, paid a routine visit to the island from the 15th to the 17th July, 1980.

(2) Mr. G. M. Lallmahomed, Divisional Scientific Officer (Plant Pathology), came to assess the phytosanitary situation with special relevance to cultivated crops from the 22nd to the 27th September, 1980.

19.1.7 Other officers who paid visits to the island were:

Mr. Hainzelin, Agronomist in charge of maize research at I.R.A.T., Reunion, came to Rodrigues on the 19th May, 1980, and during his stay of 4 days he collected ecotypes of maize for the breeding of composite varieties.

Dr. J. C. Autrey, Senior Scientific Officer of the Mauritius Sugar Industry Research Institute conducted a survey of the maize plantations to determine the status of Virus diseases present in the island from the 22nd to 27th October, 1980.

19.2 *Land Development*

Land terracing works were carried out on the following sites in 1980.

Section	*Sites*
Citronnelle ...	Camp Baptiste, Vanguard and Citronelle
Trefles ...	Mont Jatte and Trefles
St. Gabriel ...	Nassola, Mont Limon, Petit Gabriel, Le Chou, Ste. Famille, Canne Paul and Bau Vannee
Marechal ...	Papayes, Bay Malgache and Mont Cabri
La Ferme ...	Citadelle, Corail and Grand La Fouche Corail

19.2.1 The project employed 1,200 labourers at the beginning of the year. This labour force was 900 at the end of the year,, the rest having been transferred to other projects. The task work system was reintroduced in July and was observed to give far better results in terms of output than the full day system.

115 development workerrs were promoted to casual labourers and at the end of the year, the labour force employed on Land Terracing sites was made up as follows:

P.P.E. and casual labourers	...	871
Development workers	...	29

Food assistance from the World Food Programme was stopped in October and since then wages to Development workers have been paid in cash.

19.2.2 *Output of work*

During the year, the Land Terracing project employed 207,772 mandays and the following output has been recorded.

Length of canal 1 ft × 6" dug	...	...	91,562 ft
Length of canal 3 ft × 2 ft dug	...	...	722,909 ft
Length of canal 4 ft × 2 ft dug	...	...	20,630 ft
Length of canal 8 ft × 3 ft dug	...	...	206,117 ft
Length of main drains completed	...	...	95,881 ft
Bench Terraces erected ...	...	....	451,342 ft
Stones collected on sites for the erection of Bench Terraces	...	...	99,677 cubic yards
Digging " chiendent " *(Cynodon dactylon)*		...	25 arpents
Access road built	...	...	2.25 miles

19.2.3 An approximate area of 230 arpents were terraced and this low performance was due to the following:

(1) Shortage of technical staff: Mr. Moothoo left Rodrigues in 1979 and was not replaced.

(2) The delay in the re-introduction of the task work system which would have improved the output by some 40% with the same labour force.

(3) Lack of equipment and transport.

(4) The reduction in labourr force employed.

19.3 *Farm Water Supplies*

The following constructions were completed in 1980 and are in operation:

(1) Graviers Reservoirs of 62,000 gallons

(2) Vanguard Reservoir of 62,000 gallons

(3) Grand La Fouche Corail of 62,000 gallons

Two new sites opened, namely, the Rivière Banane Reservoir and Port South East Reservoir.

By December, 1980, the ground beam level was reached at Rivière Banane and excavation for foundations were completed at Port South East.

18,340 ft of new pipelines have been laid.

19.4 *Pasture Development*

Acacia plantation in the enclosed area around Mt. Baie Topaze was completed and some 50 arpents were planted with acacia as well with filao trees.

20 arpents of acacia at Crab Island were cleared of Latana bushes. Latana is being removed also in the vicinity of the airport. 100 workers were engaged in this operation and Latana was uprooted at the rate of 1.5 arpent per day. At the end of the year about 25 arpents were completed.

19.5 *Extension Service*

A. *Livestock*

During the year 1980, the following cases were treated by Officers from the Veterinary Section of the Agriculture Services:

(1) Cattle

	Cases
Pink eye	72
Difficult calving ...	3
Abcess	51
Mastitis	2
Caesarian	2
Retained placenta ...	11
Ristokia	3
Fracture	10
Sore foot	6
Injuries	3
Heart water	1
Babiosis and anaplasmosis ...	2
General deficiency ...	32
Milk fever	2
Tympanitis	2
Deworming	78
Police report	3

(2) *Sheep and goats*

Paralysis	2
Deworming	5,875

(3) *Pigs*

		Cases
Anorexia and Pyrexia	...	40
Castration of young boars	...	4
Castration of adult boars	...	8
Vitamin deficiency	...	8
Difficult farrowing	...	1

(4) *Poultry*

General prophylactic treatment for coccidiosis, coryza, avian encephalitis, Newcastle Disease, enteritis, etc. : 1,335 birds.

19.6 *Crops*

As a result of favourable climatic conditions, fresh vegetables were found during most of the year on the local market. On the other hand, the crop protection team of the Agricultural Services had considerable work to do to satisfy pesticides application demands from planters. As usual, the services were given free and some 300arpents of various crops were treated.

No onion seeds were imported from Mauritius this year because planters had harvested a reasonable stock at hand. Only 100 pounds out of the 178 pounds, produced in our nurseries, were sold to meet the requirement for the year.

About 400 tons of onion bulbs and 12 tons of garlic were harvested in 1980.

19.6.1. The Agricultural Services produced the following:

(a) 27,916 lbs of assorted vegetables were produced and disposed of as follows:

Sale to public	...	27,156 lbs
Issued to hospitals	...	760 lbs

(b) Seeds produced—

Maize	...	1,336 lbs
Groundnuts	...	356 lbs
Red beans	...	230 lbs
Onion seeds	...	139 lbs
Onion bulbs	...	873 lbs
Garlic	...	295 lbs

(c) Fruits sold to the public—

Oranges	...	2,021 units
Bananas	...	10,752 units

(d) Fruit trees and ornamentals sold to the public:—

Coconut seedlings	607 units
Jack fruit	110 seedlings
Orange grafts	40 units
Lime seedlings	428 units
Letchis layers	70 units
Other seedlings (Pawpaw, grenade etc.) ...	131
Ornamentals cuttings and seedlings ...	1,289 units

19.6.2. *Crop Production*

The main crop of maize was planted over 2,027 acres and the estimated yield is about 1,600 tons.

Were also planted : 250 acres of sweet potatoes, 157 acres of onion, 52 acres of groundnut, 33 acres of cassava and 9 acres of garlic.

19.7. *Rodrigues Export 1980*

The following produce were exported to Mauritius during the year 1980:

Cattle	429 head
Pigs	3,378 head
Goats and sheep	6,918 head
Poultry	355 crates
Onion	162 tons
Salted fish and dried octopus ...	560 bales of 150 lbs

19.7.1. The approximate values of the exports were:

429 head of cattle	@ Rs 2,800/head	Rs 1,201,200
3,338 pigs	@ Rs 825/head	2,786,850
6,918 sheep and goats	@ Rs 275/head	1,902,450
355 crates of poultry	@ Rs 1,250/crate	443,750
162 tons of onion	@ Rs 4,600/ton	745,200
560 bales of salted fish and octopus ...	@ Rs 1,350/ton	756,000
	TOTAL ...	7,835,450

19.8 *Livestock Breeding Centres*

19.8.1. Animal statistics as at the 31st December, 1980

(a) Cattle

Station	*Adult*		*Young*		*Total*
	M	*F*	*M*	*F*	
St. Gabriel ...	—	—	—	—	—
Bay Topaz ...	17	28	21	31	97
Marechal ...	2	17	9	16	44
Oyster Bay ...	—	8	3	6	17
TOTAL ...	19	53	33	53	158

There were 37 calvings producing (14 male and 23 female calves). 7 calves were sold to farmers for fattening. 3 cows, 7 male and 7 female calves died. 6 breeding bulls were received from Mauritius during 1980. 5 have been given on loan to farmers for the upgrading of local blood.

(b) Pigs

Station	*Adult*		*Yonng*		*Total*
	M	*F*	*M*	*F*	
Marechal ...	3	7	16	6	32
St. Gabriel ...	7	13	5	8	33
Bay Topaz ...	3	8	3	6	20
TOTAL ...	13	28	24	20	85

139 piglets were born (83 males and 56 females). The survival percentage at weaning age was 70.6%. 59 male and 41 female piglets were sold to farmers. 3 old boars and one sterile sow were also sold. Two old boars and one old sow died.

(c) Sheep

	Adult		*Young*		*Total*
	M	*F*	*M*	*F*	
Crab Island ...	32	102	16	28	178

Birth: 19 lambs (10 males and 9 females)
Death: 50 (7 rams, 20 ewes, 11 male and 12 female lambs)
Sale to the public: 6 young males.

(d) Goats

Station	*Adult*		*Young*		*Total*
	M	*F*	*M*	*F*	
Oyster Bay ...	2	—	1	1	4

(e) Rabbits

	Adult		*Young*		*Total*
	M	*F*	*M*	*F*	
Marechal ...	4	16	—	—	20

Birth: 123 kids
Death: 60 kids
Sale to public: 46 young males and 40 young females

(f) Ducks

Station	*Adult*		*Young*		*Total*
	M	*F*	*M*	*F*	
St. Gabriel ...	1	6	—	—	7

APPENDIX I

Staff as at 31st December, 1980

Appointment	*Name and Qualifications*	*Remarks*
Permanent Secretary	L. Purmessur, B.Sc. Econ. (London)	
Principal Assistant Secetary ...	R. M. Hurdowar, B.A. (Hons.) (East Africa) D.P.A.M. (Mauitrius)	
	J. C. Rivet, D.P.A.M. (Mauritius)	
	A. I. Oozeerally, D.P.A.M. (Mauritius)	On leave
Chief Agricultural Officer ...	B. D. N. Roy, Dip. Agric. (Mauritius) B.Sc. (Wales)	
Principal Agricultural Officer (3) ...	1. K. Lutchmeenaraidoo, Dip. Agric. (Maur.) B.Sc. Agric. (Reading)	
	2. T. M. Narain, Dip. Agric. (Maur.) B.Sc. Agric. M.Sc. Agric. Ext. (Reading)	
	3. L. R. Brunet, Dip. Agric. (Maur.) Dip. Agric. Extension (Queensland) B.Sc. Agric. (Reading)	

ADMINISTRATION

Administrative Officer (4) ...	1. K. Mudhoo, B.A. (Hons.) (Admins.) (Maur.) M.A. (Admins.) (Netherlands)	
	2. J. Ramjada, B.Sc. (Hons.) (Econ.) (London)	1 vacancy
	3. R. Veerapen (Mrs.) B.A. (Hons.) (Admins.) (Maur.)	

ESTABLISHMENT AND FINANCE DIVISION

Principal Establishment Officer ...	B. P. Sawmy
Principal Finance Officer ...	S. Gya
Principal Stores Officer ...	P. N. C. Jeantou
Senior Establishment Officer ...	L. Gopaul Mrs. D. Mardamootoo

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Establishment Officer	Mrs. H. Labour	
	Mrs. B. Dukhira	
	Mrs. E. C. M. Koa Wing	
	Mrs. K. D. Multra	
	Mrs. Y. Ramgolam	
Senior Executive Officer ...	A. Foondun	
Senior Finance Officer ...	F. Emrith	
Finance Officer	R. Ragoobarsingh	
	K. R. Poinen	
In addition there were:	6 Assistant Finance Officers	
	3 Higher Executive Officers	
	13 Executive Officers	
	38 Clerical Officers + (5 giving assistance at C.O. level)	
	48 Clerical Assistants + (4 giving assistance at C.A. level)	
	7 Senior Clerical Assistants	
	2 Higher Stores Officer	paid from the vote of Ministry of Finance
	3 Stores Officers	
	1 Assistant Stores Officer	
	5 Trainee A.S.O.	
	2 Senior Confidential Assistants	
	3 Confidential Assistants	
	11 Typists (2 giving typing assistance)	
	4 Head Office Attendants	
	16 Officer Attendants	
	7 employed on Office Attendant duties	

APPENDIX I—*continued*

AGRONOMY DIVISION

Appointment		*Name and Qualifications*	*Remarks*
Divisional Scientific Officer (Agronomy)	...	A. L. Owadally, Dip. Agri. (Maur.) B.Sc. (Hons.) Agric. Botany (Wales) Ph.D Agric. (Nottingham)	
Agricultural Superintendent	...	S. Y. E. Doomun	
Scientific Officer (Agronomy)	... ...	S. N. Naidu, Dip. Agric. (Maur.) B.Sc. (Hons.) Agric. (Maur.) M.Sc. Biometry (Reading)	On leave
		H. Rojoa, B.Sc. (Hons.) Agric. (Punjab)	
		C. G. Pallany, B.Sc. (Hons.) Agric. (Maur.)	
		L. C. K. Li Kwan Pun, Dip. Agric. (Maur.) B.Sc. (Hons.) Agric. (Maur.)	
		K. Ramdoyal, Dip. Agric. & Sugar Technology, B.Sc. (Hons.) Agric. (Maur.)	On leave
		J. M. Heerasing, B.Sc. (Hons.) Agric. (Maur.)	
		M. Y. Boodoo, B.Sc. (Hons.) Agric. (Maur.)	
Senior Technical Officer (Agriculture)	...	Y. L. Kong Ting Lun, Dip. Agric. (Maur.)	
		L. C. M. Li Ting Wai, Dip. Agric. (Maur.)	
		F. S. Lam Kee, Dip. Agric. (Maur.)	
		D. Gya, B.Sc. (Hons.) Agric. (Poona)	
		J. Dindoyal, B.Sc. (Hons.) Agric. (India)	
		P. Hanoomanjee, B.Sc. (Hons.) Agric. (Maur.)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
In addition there were:	10 Technical Officers (Agric.) +	1 on leave
	1 Officer employed to give extra assistance at Technical Officer level	
	5 Senior Technical Assistans (Agric.)	
	10 Technical Assistants (Agric.)	1 on leave
	1 Senior Field Assistant	
	2 Field Assistants	
	7 Agricultural Assistants	
	2 Clerical Officers	
	16 Clerical Assistants	
	1 Typist/Stenographer	
	7 Office Attendants	

HORTICULTURE DIVISION

Divisional Scientific Officer (Horticulture)	...	I. Rajkomar, B.Sc. (Hons.) Agric. (Udaipur) M.Sc. Crop Science) Univ. of Saskatchewan
Agricultural Superintendent	...	A. A. M. Osman, Dip. Agric. (Maur.)
Scientific Officer (Horticulture)	... ...	K. F. Lan Chow Wing, Dip. Agric. (Maur.) B.Sc. (Hons.) Agric. (Maur.)
		S. Seeruttun, Dip. Agric. (Maur.) B.Sc. (Hons.) Agric. (Maur.)
		V. Veerapa, Dip. Agric. (Maur.) B.Sc. (Hons.) Agric. (Maur.)
		D. Y. Bachraz, B.Sc. (Hons.) Agric. (Maur.)
		D. Reetoo, B.Sc. (Hons.) Agric. Horticulture (Banaras Hindu Univ.)

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Senior Technical Officer (Agriculture) ...	Mrs. A. C. Chang Hing Chong, Dip. Agric. (Maur.); cert. in vegetable growing (Wageningen)	
	C. A. Gouges, Dip. Agric. (Maur.)	
	Mrs. H. Abdoula, Dip. Agric. and Sugar Technology (Maur.)	
	Y. N. Chan Kwing Kwan, Dip. Agric. & Sugar Technology (Maur.)	
	D. Boodhun, B.Sc. Agric. (Nehru Univ. India)	
In addition there were:	4 Technical Officers (Agriculture) + 1 Officer employed to give extra assistance at Technical Officer level	
	4 Senior Technical Assistants (Agric.)	
	6 Technical Assistants (Agric.)	
	1 Senior Field Assistant	
	4 Field Assistants	
	7 Agricultutral Assistants	
	1 Executive Officer	
	1 Clerical Officer	
	16 Clerical Assistants	
	5 Office Attendants	
EXTENSION SERVICE DIVISION		
Divisional Scientific Officer (Extention) ...	S. P. Mauree, B.Sc. Agric. (Madras) Degree of Master of Agricultural Studies (Queensland Australia)	
Agricultural Superintendent ...	S. P. Vythilingum, Dip. Agric. (Maur.)	
	I. H. Sassa, Dip. Agric. (Maur.)	
Scientific Officer (Agronomy)	O. Bissonauth, Dip. Agric. B.Sc. Agric. (Maur.)	
Scientific Officer (Entomology)	M. Ramsamy, B.Sc. (London) M. Phil. (London) Ph.D (London)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Senior Technical Officer ...	R. Gohabar, B.Sc. Agric. (Sind)	
	J. C. Appapoulay, Dip. Agric. (Maur.)	
	N. Teeluck, Dip. Agric. (Maur.)	
	K. V. Lee Kien Vong, Dip. Agric. (Maur.)	
	D. Dumur, Dip. Agric. (Maur.) B.Sc. Agric. (Ludhiana)	
	B. A. C. D. Gumani, B.Sc. Agric. (India)	
	R. Khandhai, B.Sc. Agric. (India)	
	M. Aumeer, B.Sc. Agric. (Ludhiana)	
	D. Ragobur, B.Sc. Agric. (Ludhiana)	
	S. Bisnauthsing, B.Sc. Agric. (Ludhiana)	
	D. Chung Fat, Dip. Agric. & Sugar Technology (Maur.)	
In addition there were:	25 Technical Officers (Agric.)	1 on leave
	5 Technical Officers (Livestock)	
	4 Technical Assistants (Agric.)	
	29 Field Assistants	
	1 Agricultural Assistant	
	1 Publicity Assistant	
	1 Executive Officer	
	1 Clerical Officer	
	5 Clerical Assistants	
	2 Typist/Stenographers	
	3 Office Attendants + 2 P.P.E. Labourers performing Office Attendant duties	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
PLANT PATHOLOGY DIVISION		
Divisional Scientific Officer (Pant Pathology) ...	G. M. Lallmahomed, Dip. Agric. (Maur.) B.Sc. (Hons.) Agr. Biol.; Ph.D (Ibadan) Post Grad. Cert. Plant Nematology (Wageningen), M. I. Biol. (London)	
Agricultural Superintendent ...	F. B. Y. Gerval. Dip. Agric. (Maur.)	
Scientific Officer (Pant Pathology)	J. Bucha, M.Sc. (Hons.) Bot. (Auckland) B.Sc. (Auckland). Seed Pathology Cert. II (Denmark)	
	M. Pillay, B.Sc. (Hons.) Bot. (Delhi) Post Grad. Cert. Plant Protection (Wageningen)	
	M. I. Dossa, B.Sc. (Hons.) Microbiol. M.Sc. Agric. Microbiol. (Karachi)	
	M. Chinapen, B.Sc. Botany, (Madras); Post Grad. Cert. Plant Protection (Wageningen)	
	S. P. Beni Madhu, B.Sc. (General) (Punjab)	
Senior Technical Officer (Scientific) ...	D. Tourabally, Dip. Agric. (Maur.)	
	N. B. Y. Yerrigadoo, B.Sc. (Osmania), Post Grad. Cert. Plant Protection (Wageningen)	
	G. H. Futty, B.Sc. (General) Biology & Chemistry (Punjab)	
	M. Govendasamy, Dip. in Agric. & Sugar Tech. (Maur.) B.Sc. Plant & Animal Protection (Louisiana)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Senior Technical Officer ...	S. Ramessur, B.Sc. General (Punjab)	
	L. H. Lee Fook Choy, B.Sc. (Hons.) Agric. (Maur.)	On study leave without pay
	A. B. Beeharry, Dip. in Agric. & Sugar Tech. (Maur.)	
	C. K. F. Cheung Kai Suet, Dip. in Agric. & Suagr Tech. (Maur.)	
	M. A. Bhunnoo, Dip. Agric. (Maur.)	
	T. K. Ah Keng, Dip. in (Agric. & Sugar Tech. (Maur.)	
In addition there were:	7 Techincal Officers (Scientific)	2 on leave
	1 Technical Officer (Live-stock) acting as Senior Technical Officer	
	1 Extra Technical Officer	
	1 Senior Laboratory Attendant	
	7 Laboratory Attendants	
	1 Senior Clerical Assistant	
	1 Clerical Assistant	

DIVISION OF VETERINARY SERVICES

Principal Veterinary Officer ...	M. F. Mosaheb, B.V.Sc.; B.Sc.; and A.H. (Punjab) M.Sc. Tropical Veterinary Science (N. Queensland)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Veterinary Officer	L. L. Beeharry, B.V.Sc. & A.H. (Uttar Pradesh) M.Sc. Virology (Kansas State Univ.)	
	D. Sibartie, B.V.M. (Nairobi); M.V.M. (Glasgow)	
	H. Jhoree, Doctor of Vet. Medecine (Kiev)	
	R. Deenoo, Bachelor of Vet. Medecine & A.H. (Bombay)	
	J. Maudarbaccus, B.V.Sc. & A.H. (Bombay)	
	I. L. Prayag, Bachelor of Vet. Medecine (Kampala)	
	V. S. Jugessur, B.V.Sc. & A.H. (Haryana)	
	H. Bissessur, Doctor in Vet. Medecine & Master in Vet. Medecine (Moscow)	
	C. Dooky, B.V.Sc. & A.H. (Calcutta)	
	D. Meenowa, B.V.Sc. & A.H. (Haryana)	
Laboratory Technologist ...	L. H. R. Maurice, Dip. Agric. (Maur.) C.G.L.I. (Sugar Manufacture)	
	A. K. Matabadul, B.Sc. (Hons.) Microbiology (Bombay)	
In addition there were:	3 Technical Officers (Scientific)	
	12 Senior Technical Assistants (Sientific)	
	13 Technical Assistants (Livestock)	
	5 Agricultural Assistants	
	1 Senior Laboratory Attendant	
	6 Laboratory Attendants	
	1 Executive Officer	
	2 Clerical Officers	
	5 Clerical Assistants	
	2 Typists/Stenographers	
	5 Office Attendants	

APPENDIX I—*continued*

ANIMAL PRODUCTION DIVISION

Appointment	*Name and Qualifications*	*Remarks*
Divisional Scientific Officer (Animal Husbandry) ...	B. Hulman, B.Sc. Agric. (Allahabad), M. Phil. Animal Production (Reading)	
Agricultural Superintendent ...	S. Fakim, Dip. Agric. (Maur.), C.G.L.I. (Sugar Manufacture)	
Scientific Officer (Animal Husbandry)	G. Naidoo, B.V.Sc. & AH (India)	
	L. M. Ma Poon, B.Sc. (Hons.) Agric. (Ife) Dip. Agric. (Maur.)	
	A. A. Boodoo, B.Sc. (Agric. (Addis Ababa)	
	H. Gaya, B.Sc. (Agric.) Allahabad, M.Sc. Animal Production (Reading)	
	B. Raj Komar, B.Sc. (Hons.) Agric. (Maur.)	
	J. P. Teeluck, Dip. in Agric. & Sugar Tech. (Maur.), B.Sc. (Hons.) Agric. (Maur.)	
	M. R. Naseeven, B.Sc. (Hons.) Agric. (Maur.)	On leave
	K. L. Yee Tong Wah, B.Sc. (Hons.) Agric. (Maur.)	On leave
Senior Technical Officer (Agriculture) ...	A. Pooloo, Dip. (Agric.) (Maur.)	
	S. M. Sheik Hossen, M.Sc. Agric. (Kiew)	
	D. Ramessur, Dip. Agric. & Sugar Tech. (Maur.)	
Senior Technical Officer (Livestock) ...	R. Fakim, B.Sc. (Agric.) (Allahabad)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
In addition there were:	3 Technical Officers (Livestock)	
	2 Technical Officers (Agric.)	
	1 Senior Field Assistant	
	2 Field Assistants	
	4 Senior Technical Assistants (Agric.)	
	2 Technical Assistants (Agric.)	
	7 Technical Assistants (Livestock)	
	9 Agricultural Assistants	
	1 Executive Officer	
	1 Higher Clerial Officer	
	1 Clerical Officer	
	7 Clerical Assistants	
	2 Typists/Stenographers	
	7 Officer Attendants	

LAND USE AND ENVIRONMENT AND PROJECTS DIVISION

Acting Divisional Scientific Officer... (Agriculture)	M. Ramtohul, B.Sc. (Hons.) Agric. & A.H. (Uttar Pradesh), M.Sc. Hort. (Illinois)	
Scientific Officer ... ... (Agronomy)	M. V. D. Domun, B.Sc. (Hons.) Agric. (Maur.) Post Graduate Diploma in Integrated Surveys (The Netherlands)	
Scientific Officer ... ... (Environment)	T. S. Ramyead, B.Sc. Environmental Engineering (London); Member of the Chartered Institution of building Services (London)	
Agricultural Superintendent ...	B. Nundloll, London Matriculation	
	C. S. Amide, Dip. Agric. (Maur.) C.G.L.I. Sugar Manufacture	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Senior Technical Officer (Agriculture) ...	R. Mohabeer, Dip. in Agric. & Sugar Technology (Maur.)	
	S. Bissessur, B.Sc. Botany 1st Class (Madrass)	
	P. P. Mohabeer, B.Sc. Agric. (Punjab)	On leave
In addition there were:	5 Technical Officers (Agric.)	2 on leave
	2 Surveying Assistants	
	1 Draughtsman	
	2 Printing Machine Operators	
	2 Filed Assistants	On leave
	2 Clerical Officers	
	3 Clerical Assistants	
	1 Typist/Stenographer	On leave
	3 Office Attendants + 2 P.P.E. Lab. performing O.A. duties	

ENGINEERING DIVISION

Principal Agricultural Engineer ...	A. R. Satar, B.Sc. Agric. Eng. (Israel) M.I. Agric. E., Dip. Agric. (Maur.)	
Agricultural Engineer	N. Toolsee, B.E. (Agric.) (Udaipur)	On leave
Senior Agricultural Engineer ...	S. Purmanand, B.E. Agric. (Udaipur)	
	S. J. Deschanel, M.Sc. Mechanical Eng.) Astra-khan Fisheries Inst.	
Assistant Agricultural Engineer ...	M. Morad Dip. (Agric.) Maur.)	
In addition there were:	4 Technical Officers (Engineering)	2 on leave
	1 Field Assistant	
	1 Executive Officer	
	1 Clerical Officer	
	2 Clerical Assistants	
	1 Office Attendant	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
ENTOMOLOGY DIVISION		
Divisional Scientific Officer (Entomology) ...	M. J. L. Monty, B.Sc. (Hons.) Entomol. (Queensland), Dip. Agric. (Maur.)	
Scientific Officer (Entomology)	A. Joomaye, B.Sc. (Hons.) Zool. & Bot. (East Africa), M.Sc. (I.A.R.I.)	
	Mrs. S. I. Seewooruttun, B.Sc. Zool. M.Sc. Zool. (Dehli)	
	D. Abeeluck, B.Sc. (Hons.) Zoology	
Senior Technical Officer (Agriculture) ...	Mrs. M. Li Ting Wai, Dip. Agric. (Maur.)	
In addition there were:	1 Technical Officer (Agriculture)	
	3 Technical Officers (Scientific)	
	2 Extra Technical Officers	
	1 Senior Field Assistant	
	2 Field Assistants	
	3 Agricultural Assistants	
	1 Senior Laboratory Attendant	
	6 Laboratory Attendants	
	1 Clerical Officer	
	1 Office Attendant	
FIELD SERVICES DIVISION		
Senior Agricultural Supeintendent ...	M. Sooltangos, Dip. (Agric.) (Maur.)	
Agricultural Superintendent ...	Y. Aumjaud, Dip. Agric. (Maur.)	
Senior Technical Officer (Agriculture) ...	S. Panyandee, M.Sc. Agric. (Bucharest)	
	Mrs. F. Lallmahomed-Ciechanowski, M.Sc. in Agric. (Eng.) Poland	
In additional there were:	1 Technical Officer (Agriculture)	
	3 Technical Assistants (Agriculture)	
	1 Technical Assistant (Livestock)	
	2 Agricultural Assistants	
	2 Clerical Officers	
	7 Clerical Assistants	
	1 Office Attendant + 4 P.P.E. Labourers performing Office Office Attendant duties	

APPENDIX I—*continued*

AGRICULTURAL CHEMISTRY DIVISION

Appointment	*Name and Qualifications*	*Remarks*
Divisional Scientific Officer (Agric. Chemistry)	L. C. Lam Thoun Mine, B.Sc. Chem. (London), A.C.R. (Maur.)	
Scientific Officer (Agric. Chemistry)	N. N. Ramanjooloo, B.Sc. (Hons.) Chemistry (Dehli), A.C.R. (Maur.)	
	A. H. Mohungoo, B.Sc. (Hons.) Chem. Aligarh), A.C.R. (Maur.)	
	N. Coonjan, B.Sc. (Hons.) Chem. Bombay, A.C.R. (Maur.)	
	D. Chintaram, B.Sc. General, M.Sc. (Organic Chemistry) Meerut Univ. India)	
Senior Technical Officer (Scientific)	Miss O. C. Wan Hok Chee, Dip. in Agric. & Sugar Tech. (Maur.)	
In addition there were:	3 Technical Officers (Scientific)	
	1 Senior Laboratory Attendant	
	7 Laboatory Attendants	
	1 Clerical Assistant	
	1 Office Attendant	

DAIRY CHEMISTRY DIVISION

Divisional Scientific Officer (Dairy)	P. Mardamootoo, B.Sc. (Hons.) Chemistry, M.Sc. Chemistry (Delhi), Ph.D. (Doctor of Philosphy) (Illinois)	
Scientific Officer (Dairy Chemistry)	J. F. S. Ng Man Sun, B.Sc. (Hons.) Chemistry (Manchester) M.Sc. Food Science (Dairy Science Option) (Reading)	
	P. N. Rangasamy, M.Sc. (Chemistry) Patrice Lumumba Univ. (Russia)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Senior Technical Officer ...	S. Ramessur, B.Sc. General (Punjab)	
In addition there were:	3 Technical Officers (Scientific)	
	1 Senior Laboratory Attendant	
	4 Laboratory Attendants	
	1 Clerical Assistant	
	1 Typist/Stenographer	

CANE PLANTERS' & MILLERS' ARBITRATION & CONTROL BOARD

General Manager	A. A. Aumeerally, Dip. Agric. (Maur.) C.G.L. I. (Sugar Manufcature), B.Sc. Sugar Eng.; B.Sc. Chem. Eng. (L.S.U.)	
Sugar Technologist	I. D. Nawoor, B.Sc. General, B.Sc. (Hons.) Chem. (Wales)	
Accountant	C. Ramphul	
Senior Area Superintendent ...	I. Aumeerally, Dip. (Agric.) (Maur.) City & Guilds of London Institute (Sugar Manufacture)	
Assistant Sugar Technologist ...	A. A. Tin Loi, Dip. (Hons.) Agric. (Maur.) B.Sc. (Hons.) Sugar Tech. (Maur.)	
	D. Valaydon, B.Sc. Sugar Tech. & Dip. in Agri. & Sugar Tech. (Maur.)	
Area Superintendent	M. A. Peeroo, Dip. (Agric.) (Maur.)	
	S. S. Wong Ng, Dip. Agric. (Maur.)	
	K. C. Li Luen Fong, Dip. Agric. (Maur.)	

APPENDIX I—*continued*

Appointment	*Name and Qualifications*	*Remarks*
Finance Officer	A. R. Bhowan	
Senior Technical Officer (Sugar) ...	P. D. Pareima, Dip. in Agric. & Sugar Technology (Maur.) F. Goolamhossen, Dip. in Agric. & Sugar Technology (Maur.) V. Aubeeluck, Dip. in Agric. & Sugar Tech. (Maur.) S. M A. Kurmally, Dip. in Agric. & Sugar Tech. (Hons.) (Maur.) M. A. Bhunnoo, Dip. in Agric. & Sugar Technology (Maur.) M. K. Nujjoo, Dip. in Agric. & Sugar Tech. (Maur.) M. A. Issany, Dip. in Agric. & Sugar Tech. (Maur.)	
In addition there were:	12 Technical Officers (Sugar) 3 Mechanical Officers 27 Senior Technical Assistants 35 Technical Assistants 1 Laboratory Attendant 1 Punch Room Supervisor 4 Punch Verifier Operators 1 Principal Executive Officer 1 Senior Executive Officer 1 Higher Executive Officer 1 Senior Confidential Assistant 1 Confidential Assistant 5 Clerical Officers 10 Clerical Assistants 1 Telephone Attendant 2 Office Attendants + 1 P.P.E. Labourer employed on Office Attendant duties	

AGRICULTURAL SERVICES — RODRIGUES

Agricultural Superintendent ...	John Franklin Kwet-On, Dip. Agric. (Maur.)	
Senior Technical Officer ...	Joseph Wilson Tolbize, Dip. Agric. (Maur.)	
In addition there were:	1 Veterinary Officer 1 Technical Officer 1 Field Assistant	On tour of service

APPENDIX II

Composition of Principal Boards and Committees

(i) Board of Agriculture, Natural Resources and the Environment

The Permanent Secretary, Ministry of Agriculture and Natural Resources and the Environment—*Chairman*

The Chief Agricultural Officer

The Conservator of Forests

Mr. R. Yat Sin, representative of the Ministry of Finance

Mr. G. Danjoux, representative of the Ministry of Housing, Lands and Town and Country Planning

Mr. B. T. Barossee, representative of the Ministry of Fisheries and Cooperative Development

Mr. S. Hossenbux, representative of the Ministry of Labour and Industrial Relations

The Honourable L. C. N. Guimbeau, M.L.A.

The Honourable Mrs. Ghislaine Henry, M.L.A.

The Honourable K. Coonjan, M.L.A.

The Honourable C. Uteem, M.L.A.

Mr. Rishy Ramlogun
Mr. L. M. Mungur } representatives of small sugar planters

Mr. Allan Cambier, representative of large sugarcane planters

Mr. Robert Antoine, C.B.E., representative of the Mauritius Sugar Industry Research Institute

Dr. the Honourable A. S. Kasenally, M.L.A., representative of the University of Mauritius

Mr. Adolphe Vallet, representative of the Chamber of Agriculture

Mr. Narainduth Dookhony, representative of the Mauritius Cooperative Agricultural Federation Limited

(ii) The Cane Planters and Millers Arbitration and Control Board

Mr. L. E. Venchard, Q.C.—*Chairman*

Mr. A. I. Oozeerally, Administrative Officer, Ministry of Agriculture, representative of the Ministry of Agriculture and Natural Resources and the Environment (up to 8th June, 1980)

Mr. A. Veerasamy, Administrative Officer, Ministry of Agriculture, representative of the Ministry of Agriculture and Natural Resources and the Environment (up to 14th October, 1980)

Mr. J. Ramjada, Administrative Officer, Ministry of Agriculture, representative of the Minister of Agriculture and Natural Resources and the Environment (as from 15th October, 1980)

Mr. Raouf Bundhun, Independent Member

Mr. Serge Staub
Mr. Théo Maigrot } Representatives of Millers

APPENDIX II—*continued*

THE CANE PLANTERS AND MILLERS ARBITRATION AND CONTROL BOARD—*continued*

Mr. Balkishna Ramphul, representative of planters cultivating cane on 30 or more arpents of land

Mr. L. M. Mungur, representative of planters cultivating cane on less than 30 arpents of land

Mr. R. Seeruttun, C.B.E., representative of planters who are members of credit cooperative societies

(iii) TOBACCO BOARD

A Principal Agricultural Officer—*Chairman*

The Commissioner of Excise—*Vice-Chairman*

*The General Manager, British-American Tobacco Company (Mauritius) Limited, or his representative

The Factory Manager, British-American Tobacco Company (Mauritius) Limited

Mr. Jugdeo Rampersad

Mr. Soomaroo Butan

Mr. P. Ramkhelawon

Mr. M. I. C. Gunness

Mr. O. Maudarbaccus

Mr. Beewa Mahadoo

Mr. D. Gungadeen

Mr. I. N. Roy

(iv) LAND SETTLEMENT COMMITTEE

The Divisional Scientific Officer (Land Use)—*Chairman*

Honourable L. C. N. Guimbeau, M.L.A.

Honourable A. R. N. A. Peeroo, M.L.A.

The Divisional Scientific Officer (Extension)

A repesentative of the Ministry of Housing, Lands and Town and Country Planning

A representative of the Ministry of Cooperatives and Cooperative Development

The Agricultural Superintendent (Land Use)

Mr. A. Cambier, representative of the Large Sugarcane Planters

*The General Manager of the Tobacco Board

APPENDIX II—*continued*

(v) TEA BOARD

Mr. T. M. Narain, Principal Agricultural Officer—*Chairman*

Mr. R. Gya, Principal Finance Officer, representative of the Ministry of Finance

The General Manager, Tea Development Authority

The Registrar of Cooperative Societies or his representative

Mr. Claude Giraud, representative of the Chamber of Agriculture

Mr. Kreshnaduth Mussai
Mr. Raoul Corson } Representatives of manufacturers

Mr. Hassam Thupsee, representative of planters

Mr. Balkeesun Moonowah, representative of metayers

Mr. H. Ramdin
Mr. D. Gungadeen } Two other persons

(vi) SUGAR MILLERS DEVELOPMENT FUND COMMITTEE

Mr. L. Purmessur, Permanent Secretary, representative of the Minister of Agriculture and Natural Resources and the Environment—*Chairman*

Mr. B. Ghoorah, Senior Economist, representative of the Minister of Finance

Mr. A. Pierre Dalais

Mr. Pierre Dinan

Mr. Cyril Lagesse

Mr. Joseph Leclézio

Mr. E. Peter G. White

(vii) SUGAR PLANTERS DEVELOPMENT FUND COMMITTEE

Mr. R. Hurdowar, Principal Assistant Secretary, representative of the Minister of Agriculture and Natural Resources and the Environment—*Chaiman*

Mr. B. Ghoorah, Senior Economist, representative of the Minister of Finance

Mr. C. Moti, Registrar of Cooperative Societies, representative of the Minister of Fisheries and Cooperatives and Cooperative Development

Mr. L. Jeetoo, Economist, representative of the Minister of Economic Planning and Development

Mr. H. Ruhee
Mr. B. Beeharry
Mr. N. Dookhony
Mr. C. Jawaheer
Mr. G. Seeam } Representatives of planters

APPENDIX II—*continued*

(viii) Sugar Industry Development Fund Committee

Mr. L. Purmessur, Permanent Secretary, representative of the Minister of Agriculture and Natural Resources and the Environment—*Chairman*

Mr. B. Ghoorah, Senior Economist, representative of the Minister of Finance

Mr. E. P. G. White

Mr. B. Beeharry

Mr. H. Ruhee

Mr. S. Bunjun

Mr. R. Osman

(ix) Sugar Planters Mechanical Pool Corporation Board

Mr. S. Mauree, Divisional Scientific Officer, representative of the Ministry of Agriculture and Natural Resources and the Environment

Mr. D. Naugah, Economist, representative of the Ministry of Finance

A representative of the Sugar Planters Development Fund

Mr. R. Balgobin

Mr. R. Hardy

Mr. S. Bunjun

Mr. R. Mohith

(x) Tea Development Authority

Mr. Y. St. Guillaume—*Chairman*

The Chief Agricultural Officer, Ministry of Agriculture and Natural Resources and the Environment—*Vice-Chairman*

Mr. J. C. Rivet, Administrative Officer, representative the Ministry of Agriculture and Natural Resources and the Environment

The Registrar of Cooperative Societies

The Chairman of the Tea Board

Mr. P. Ujoodha, Economist, representing the Ministry of Finance

Mr. Philippe de Maroussem, representing the Chamber of Agriculture

Mr. Deochand Gungah, representing the Federation of Credit and Tea Marketing Cooperative Societies

Mr. Guy Raffray

APPENDIX II—*continued*

(xi) THE AGRICULTURAL MARKETING BOARD

Mr. T. Callychurn—*Chairman*

Mr. G. Kooraram—*Vice-Chairman*

Official Members

The Chief Agricultural Officer, representing the Ministry of Agriculture and Natural Resources and the Environment

The Principal Finance Officer, Ministry of Agriculture, representing the Ministry of Finace

The Principal Assistant Secretary, Ministry of Commerce and Industry or his representative

The Registrar of Cooperative Societies or his representative

Unofficial Members

Mr. P. Rouillard

Mr. M. K. Ng Wong Hing

Mr. C. Genevieve

Mr. D. Foogooa

Mr. P. Rakhal

Mr. H. Ramdin

APPENDIX III

Legislation

Proclamations

No. 2 of 1980	To fix the day of the coming into operation of the Chemical Fertilizers Control Act 1978
No. 6 of 1980	To extend the Deer Shooting Season

Acts

No. 6 of 1980	The Sugar Millers (Levy of Duty) (Amendment) Act 1980
No. 7 of 1980	The Sugar Insurance Fund (Amendment) Act 1980
No. 10 of 1980	The Export Duty (Sugar) (Seventy-Five Percent Surcharge) Act 1980
No. 11 of 1980	The National Federation of Young Farmers' Clubs Incorporation (Amendment) Act 1980
No. 12 of 1980	The Sugar Industry Labour Welfare Fund (Amendment) Act 1980
No. 29 of 1980	The Sugar Industry Development Funds (Amendment) Act 1980

Government Notices

No. 43 of 1980	The Chemical Fertilizers Control (Licence) Regulations 1980
No. 50 of 1980	The Mauritius Sugar Terminal (Authorised Body) Order 1980
No. 59 of 1980	The Agricultural Chemists Regulations 1980
No. 110 of 1980	The Plants (Importation and Exportation) (Amendment) Regulations 1980
No. 147 of 1980	The Sugar Industry Development Funds (Rates of Duty) Order 1980
No. 151 of 1980	The Sugarcane (Specification of Varieties) (Amendment) Order 1980
No. 166 of 1980	The Sugar Export Duty Order 1980
No. 186 of 1980	The Meat (Shops) Regulations 1980
No. 277 of 1980	The Tea Industry Control Regulations 1980
No. 282 of 1980	The Mauritius Sugar Industry Research Institute (Rates of Cess) Order 1980
No. 345 of 1980	The Sugar Industry Labour Welfare Fund (Rates of Duty) Order 1980.

APPENDIX IV

List of Publications and contributions to literature by Officers of the Agricultural Services during 1980

Name of Author	*Title of Paper*	*Name Vol. Page Nos. of Periodical in which published*
C.G. Pallany and Y.L. Kong Ting Lun	The production of tobacco seeds	Revue Agricole et Sucrière de l'Ile Maurice, Vol. 59 pages 129 - 134
D. Bundhoo	An analysis of some problems in the production of flue-cured tobacco	Revue Agricole et Sucrière de l'Ile Maurice, Vol. 59 pages 135 - 146
K.F. Lan Chow Wing and A.L. Owadally	The cultivation of okra in Mauritius	Technical Bulletin, Ministry of Agriculture N.R. and the Env., Mauritius, No. 2, 1980,
M. Ramtohul and A.L. Owadally	Effects of monthly time of sowing on the yield of onion cultivars (ALLIUM Cepa L.)	Revue Agricole et Sucrière de l'Ile Maurice, Vol. 58 Pages 171 - 179
K.F. Lan Chow Wing and A.L. Owadally	Tomato I. Some aspects of Production in Mauritius	Technical Bulletin, Ministry of Agriculture, N.R. and the Env., Mauritius, No. 2 1980
K.F. Lan Chow Wing and A.L. Owadally	Selection of Vegetable Varieties	Revue Agricole et Sucrière de l'Ile Maurice, Vol. 59 Pages 189 - 200
L.K. Ma Poon ...	Degradability of some high protein forages in the rumen	Tropical Animal Production, Vol. 5, 1980
M. Ramsamy ...	Developments of a sampling plan for estimates of the absolute population of *Stomoxys Nigra* Macquart (Diptera; Muscidae).	Journal of Insect Science and its application, September 1980, 2nd issue Vol. 1
K.L. Yee Tong Wah and B. Hulman	The effect of feeding liquid molasses to goats	Technical Bulletin, Ministry of Agricu ture, N.R. and the Env., Mauritius, No. 2 1980
L.K. Ma Poon and B. Hulman	Leucaena and sweet potato forages as sources of protein and of roughage for calves on restricted suckling and molasses/urea	Technical Bulletin, Ministry of Agriculture, N.R. and the Env., Mauritius, No. 2 1980
P.N. Rangasamy ...	The influence of production methods on milk quality	Technical Bulletin, Ministry of Agriculture, N.R. and the Env., Mauritius, No. 2 1980
O. Bissonauth ...	Observations on some new varieties of tomato from Taiwan	Technical Bulletin, Ministry of Agriculture, N.R. and the Env., Mauritius, No. 2 1980

APPENDIX V

Conversion Table

1 Arpent	1.043 acres
1 Gaulette	10.61 feet
1 Metric Ton	1,000 kilos
1 Long Ton	1,016 kilos
1 Pound Avoirdupois	454 grms
1 kilo	1,000 grms
1 Hundredweight	50.803 kilos
1 Cord	92.82 cubic feet
1 Imperial Gallon	4.45 litres
1 Rupee	5.37 pence

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